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OF

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ORIGINAL COMMUNICATIONS.

ART. XLIII.—NOTICE OF A NEW SPECIES OF LYTTA.

By Joseph Carson. M. D.

As every addition to the resources of the medical art is important and interesting, from whatever department of nature it may be derived, and whether foreign or indigenous, I am induced to lay before the public an account of a species of Lytta which has not hitherto attracted attention. Its introduction will increase the number of individuals belonging to the tribe of insects known to possess vesicating properties, and although hardly to be considered important to the practitioners of the United States—who are so plentifully supplied with its congeners, yet a knowledge of its existence and value may be useful to those who visit the country where it is a native.

Lytta rufipes.

Specific characters. Black with red feet.

This species can be best compared with L. atrata of our own country, from which it differs in size, being rather larger and more elongated, elytra black and polished, smooth, without hair, *feet rufous*, antennae filiform, the length of head and thorax, second joint short, third elongated, as long as the first, rest nearly equal, thorax small.

At the suggestion of my friend, Dr. C. Pickering, it has been named *L. rufipes* from the colour of its feet.

Fig. 1, in the Plate, represents the dorsal view. Fig. 2, the ventral.

The history of this insect is the following.—A small quantity of them was sent from Valparaiso by Dr. STYLES of that place to Dr. RUSCHENBERGER of the U. S. Navy; he stated in the letter which accompanied them, that he had procured the insect from an apothecary of his town, who assured him that it was peculiar to Chili, and extensively used by the native practitioners to produce vesication; it was also asserted that this effect was fully accomplished in four hours, and that it was attended with more uneasiness than by the common Spanish fly. From some trials which have been made, vesication was fully accomplished at the termination of six hours, which is less by one half than the period usually allowed to the officinal article; but perhaps some portion of activity had been lost from age, as the specimen experimented upon had been kept nearly three years.

ART. XLIV.—NOTES ON THE SPECIES OF CASSIA WHICH YIELD THE SENNA. By JOSEPH CARSON, M. D.

(Continued from the last.)

IN continuation of the remarks which were made in the last number, we shall now take up the consideration of such plants as enter into the composition of the Alexandrian Senna, and form component portions of that drug, but which are separate and distinct in botanical affinities from the genus Cassia. From the circumstance of their being either accidentally or designedly associated with it in commerce, all points of their history become matters of interest. It has been the design throughout, to present our statements in a way calculated to exhibit the degree of certainty which had been attained with regard to the species of Cassia already noticed. An appreciation of the difficulties to be encountered in the attempt to arrive at just conclusions, could only be entertained, by contrasting the accounts and descriptions of the authors who have

treated of them; the suggestions thrown out with the view of solving some of the doubts originating from conflicting records, and the mode of reasoning, founded on some of the circumstances which regulate the changes of plants, are not intended to usurp the place of facts. These must speak for themselves, wherever they can be positively ascertained; but in the present instance, it is the want of them, which we have to lament. The subject is still capable of much elucidation, and it is to be desired that the obscure portions of the history of the Sennas, may soon be satisfactorily determined.

The most conspicuous plant which enters as an adulterating article is the Argel; it belongs to the genus Cynanchum; it is called C. *argel*, by DELILE, and C. *oleæfolium*, by NECTOUX; prior to the investigations of these botanists it was unknown.

Cynanchum is placed by LINDLEY, in the natural Order Asclepiadeæ; it formerly was ranged in that of Apocynæ of JUSSIEU; and DELILE describes it as appertaining to this order. Between Apocyneæ and Asclepiadeæ, a distinction has been drawn by Mr. R. BROWN, founded upon the peculiar character of the reproductive apparatus. In the first mentioned, all the interior parts of the flower within the corolla are distinct; "but in the latter, all of them are consolidated into a single body, the centre of which is occupied by a broad disklike stigma; and the grains of pollen cohere, in the shape of waxy bodies, attached finally to the five corners of this stigma, to which they adhere by the intervention of peculiar glands."

Cynanchum presents these peculiarities, as may be observed from its generic description. Calyx 5-toothed, very small and persistent. Corolla rotate. Lepanthium simple, cylindric, five to twenty lobed, surrounding the orifice of the tube. Stamina as in Asclepias. Stigmata two. Follicles two. Seed comose.

The species which now interests us is thus characterized:

C. argel, caule bipedali, erecto ramoso, foliis lanceolatis glabris.

The stem, which is about three feet high, sends off slender, straight, cylindrical branches; the leaves are opposite, lanceolate, of a pale green hue, supported on short petioles, their

central nerve is prominent; the flowers are white, numerous, and disposed in dichotomous clusters in the axils of the leaves, at the summit of the branches; the calyx of each flower is short, with five divisions; corolla deeply 5-parted, rotate, segments linear and acute; an interior crown, with 5 plicæ and 5 teeth, surrounds the stamens, which, to the number of five, are united in the centre of the flower, so as to form a truncated body elevated upon a pedicel formed by the filaments. The fruit consists of two ovoid pointed follicles, the exterior substance of which is glabrous, hard, thick, and spotted; they contain imbricate, ovoid, comatose seed.*

At the time DELILE wrote, the separation of the order Apocynæ had not been made; he therefore was correct in assigning to this plant the affinities of this order. Argel is easily detected in Senna, by its want of agreement with the characteristics of Cassia.

Periploca græca is also stated to be introduced into Senna. Its leaves are not a little unlike the Indian article, except that they are destitute of the marked unequal base of the species of Cassia, and have a more brilliant green colour. It belongs as the above to the family Asclepiadeæ.

The *Colutea arborescens*, which is said to form sometimes a part of this drug—belongs to the same order Leguminosæ; its leaves are small, rounded and strikingly emarginate, with the base equal, so that no difficulty is presented in detecting it.

Indian Senna.—With respect to the plant which furnishes this commercial variety of the drug, considerable doubt and uncertainty still exist, as may be perceived from the accounts which have been given of it. This appears the more extraordinary, as it has been so long known as a medicine and so much dealt in as an article of trade, particularly from India. Among the numerous species of Cassia noticed by ROXBURGH, this has not been alluded to, so far as we can discover; nor does it appear that WALLICK or CAREY, for so long a time residents of the East,

* DELILE. Description des sénés. Memoires sur l'Egypt tome iii.

have paid any particular attention to the subject. We are therefore still left in a measure to conjecture. The plant yielding Indian Senna was for a long time confounded with the first of which we have treated. DELILE suggested that it is the one alluded to by FORSKALL under the title of *lanceolata;* we have however shown reason for supposing that this is his own plant, the C. acutifolia, and our opinion is substantiated by the authority of DECANDOLLE. DELILE was led to believe that the lanceolata of FORSKALL, was the Indian Senna, from his having procured some of the latter from Arabia, and finding it different, concluded that it had been mistaken for the Alexandrian. Now the description of FORSKALL and the remarks connected with it which were quoted entire, are strong evidence in favour of the opinion that two kinds were known to him, viz. lanceolata and another specified in the following words. "Senna Meccae Lohaiæ inveniebatur foliis 5–9 jugis *lineari lanceolatis*," which distinction does not seem to have been appreciated by DELILE. From the approximation to the descriptions alluded to hereafter, it is extremely probable that this latter is the Indian variety. FORSKALL, moreover, penetrated into Arabia by way of Egypt, so that his mind in the first instance must have been impressed with the characters of the Alexandrian article. M. LIMAIRE LISANCOUR in the year 1821—proposed the specific name *elongata* for the Indian Senna, (*Journal de Pharmacie*) from the elongated shape of its leaflets. It had been noticed by LEMERY and POIRET, who termed it *Sene de la pique;* and in Arabic, it had been known by the designation *Sena lessam asfour,* meaning bird's tongue, (*lingua avis.*) M. FEE has given a full description of the Indian Senna, and has adopted the name *elongata,* (*Journal de Chemie Med.;*) the account has been introduced into a former number of this Journal, and it is only necessary to refer to it in this place. The characters detailed by the above author strengthen the impression of its being the second variety of FORSKALL.

DECANDOLLE has apparently the same plant in view under the specific name of C. ligustrinoides, which he states is confounded in the shops with the C. lanceolata.

The conclusions to which we are led from the perusal of the facts and evidence presented by the authorities above cited, are the following:

1. That the C. acutifolia of DELILE and lanceolata of FORSKALL and NECTOUX are the same.

2. That the C. ovata of MERAT and DE LENS is a variety of lanceolata.

3. That the C. elongata, of LEMAIRE and FEE is the variety alluded to by FORSKALL as having been found in Arabia, and the C. ligustrinoides of DECANDOLLE.

A species of Cassia has been noticed in Liberia by Dr. SKINNER,* for several years a resident of that colony, and who has evinced great zeal and industry in his efforts to investigate the Natural History and resources of Western Africa. He has forwarded specimens of the plant to the United States, one of which is deposited in the Herbarium of the Academy of Natural Sciences. From the experiments of Dr. SKINNER we are led to believe that it may become a useful auxiliary in medicine, particularly in the country where it is indigenous. Upon trial its properties were found to be highly purgative, even more so than the officinal Senna; a single leaf (including the stem and leaflets) was sufficient for administration at a dose. The specimen sent is imperfect, consisting but of the leaves and fruit; sufficient however is presented to obtain some idea of the plant.

The leaf consists of 5 pair of opposite folioles, the superior longest, upon short petioles, elliptic, $3\frac{1}{2}$ inches long and 2 broad, slightly mucronate, smooth and glaucous on the under surface, superior veins prominent giving a reticulated aspect, destitute of glands on the petiole. The fruit is flat, compressed, straight, 3 inches long and half an inch broad; suture prominent, the external surface of the legume marked with numerous ridges, which are at right angles to the suture and extend across the whole legume, corresponding to the seed. Colour dark brown.

From these isolated portions it is to be supposed that the plant is herbaceous and attains some size.

* A proper name for this species, would be *Cassia skinneri*.

ART. XLV.—A BRIEF SKETCH OF THE PROGRESS AND PRESENT STATE OF PHARMACY IN THE UNITED STATES OF AMERICA.

By Wm. R. Fisher, Graduate of Pharmacy, and Associate Member of the Philadelphia College of Pharmacy.

(Read before the Maryland Academy of Science and Literature.)

There have been, as yet, but few legislative enactments intended to control or direct the exercise of the profession of Pharmacy. Like most other branches of industry in this country, its regulation has been left to the honesty of those who pursue it, and the all controlling influence of public opinion; and the improvements, which have hitherto been made, are attributable chiefly to the latter cause, exercising itself in an increased competition, and the necessary consequence, greater efforts to attract custom, by a more careful attention to the qualities of the medicines, required for family use, as well as neatness and cleanness observed in dispensing them. The business of the apothecary, or druggist and chemist, as he is generally styled, is limited exclusively to the preparation and sale of medicines; and hence, the influence of competition is more directly felt than would otherwise be the case, if he united in his person the more enlarged duties which are undertaken by the class in England under the same denomination.

But notwithstanding the influence of competition in producing the effects above alluded to, the Science of Pharmacy is but illy practised throughout this country. The great temptations which exist, to increase profits by the purchase of cheap articles, and the absence of nearly all legal qualifications necessary to conduct the business, offer sufficient reasons why this department of Medical Science should be so far behind its collateral branches in its practical operations.

It was but recently, that the practice of compounding prescriptions in the office of the physician, existed universally throughout this country, and still does to a great extent, ex-

cept in the large cities. There the necessity for a division of labour is beginning to be felt, and the consequence has been, that several of our cities now possess pharmaceutists as well educated as the duties of their profession require.

Not thirty years ago, the druggist's shop was a mere warehouse or magazine, whence physicians drew their supplies for the purpose of dispensing medicines to their patients; whence paints, glass and varnish were distributed from the same hands, as rhubarb, calomel and magnesia; and whence arsenic and cream of tartar were furnished, wrapped in an undistinguishable manner, each destitute of any mark by which its different character might be recognised. Within that period, a new order of things has, in some places, sprung up;—prescriptions are now compounded with as much skill, accuracy and neatness, as may be found in any other country of the globe; and from the best regulated establishments, nothing is put up or suffered to go out, without a distinct and appropriate label. Another advantageous change has also been effected: Pharmacy, properly so called, has been separated from mere dealing in drugs, and the two classes of retail and wholesale druggists, have become almost entirely distinct. Paints and their concomitants are rarely found exposed for sale in those shops where the practice of dispensing medicines for family consumption is pursued, being entirely incompatible with the order, neatness and cleanliness which have been found requisite to command the confidence and patronage of the public. This happy change, although mainly due to the effect of competition, has been ably, and honourably for those concerned, promoted by the voluntary exertions of the apothecaries themselves, to improve the condition of their business, and raise its standard of estimation with society. Among the means adopted to produce this effect, was the establishment of Colleges of Pharmacy, by which rules are prescribed for the general regulation of their members in the exercise of their profession; and the sciences of Chemistry, Materia Medica, and Botany, taught to the young men engaged in acquiring a knowledge of the business. A degree in Pharmacy was also

established, and the theses which have been offered, have generally been creditable productions, evincing an acquaintance with analytical chemistry, scarcely to have been expected from those whose constant occupation in a laborious and engrossing pursuit, leaves them but little time to devote to the study and practice of this most intricate and delicate scientific research.

Another important aid in this work of reform, has been the establishment of a Journal by the Philadelphia College of Pharmacy, devoted to the publication of original papers and selections on pharmaceutic subjects, and the collateral branches of physical science. This Journal was commenced in 1829. It is published quarterly, and has been well sustained, if a constantly increasing subscription list be any evidence of approval by the public. At the period of its establishment, it was called the "Journal of the Philadelphia College of Pharmacy," but with the commencement of the seventh volume, its scope was enlarged, and the title changed to that of "The American Journal of Pharmacy." It is still published by the Philadelphia College, but a National character is given to it, by the appointment of special collaborators in the chief cities of the Union, from whom many communications of interest have been received. The pages of the Journal, devoted expressly to the use and instruction of the profession, have been constantly filled with original essays and selections, by which the honest apothecary has been aided in his labours, and the devices of the designing sophisticator been detected and exposed. A highly complimentary notice has already been contained in "The British and Foreign Medical Review," and several communications have been transferred from among its contents, to the pages of an able contemporary, the "Journal de Chemie Medicale." It is received in exchange by most, if not all, of the French and German journals, devoted to kindred objects. The most marked and beneficial effects have followed its publication, and important results are anticipated in the improvement of the practice of Pharmacy in this country. This Journal is very generally read and esteemed by

the profession, and may be considered as one of the most important aids in effecting the reform which is rapidly progressing. It may not be amiss to state, that to the industry and ability of the first editor, Dr. Benjamin Ellis, as well as that of his successor, Dr. Griffith, much of the success which has attended its establishment, is due.

With the exception of a law in South Carolina and Georgia, and a similar one in New York (presently to be referred to) requiring, an examination before a board of censors, of those who intend to vend medicines, (and all of which, from some defect, I learn are inoperative;) no laws exist controlling the practice of this profession. Every one is at liberty to undertake the preparation, and dispensation of medicines; and success in business is only to be attained, by neatness and correctness in the individual conducting it. It is to be hoped that public opinion, will ere long direct itself to the employment and encouragement of those, who have especially qualified themselves for the trust, by taking the degree of the College; but as yet too little importance has been attached by the public at large, to the advantages to be derived from a proper study of the profession by those who pursue it. A race of scientific apothecaries is however springing up, and must ere long supersede the mere venders of medicines, who have hitherto had the whole business in their hands. The prices at which medicines are sold, vary considerably in the different cities, and are but poor compensation for an industrious, laborious, and conscientious attention to the duties of an apothecary. It is to be hoped that public opinion will eventually fix the proper estimate upon the value of this species of labour, and afford such a recompense, as will procure the services of well educated, skilful, responsible professors, of this important branch of the healing art.

In this brief sketch of the state of Pharmacy it is impossible to touch upon all the topics connected with it. Those possessing the greatest interest have been already mentioned, and I pass to the consideration of the origin, and progress of the Colleges of Pharmacy of Philadelphia and New York.

which are in a flourishing condition and contributing beneficially to the improvement of the Science.

The Philadelphia College of Pharmacy, established in 1820 by the voluntary association of the apothecaries of that city, numbers now about ninety resident, twenty-five associate, and thirty honorary members. Among the latter are embraced, many of the most distinguished professors of medical and chemical science of the present age, and of all countries. Since the degree of Pharmacy was established in this College, fifty-five graduates have obtained its diploma.

When it is considered that those who obtain this testimony of their competency to practise the profession are solely induced by an honest pride to possess the evidence of their qualifications, and that no interest is directly promoted by it, it must be conceded that at no distant day, this country will possess a corps of distinguished pharmaceutists, competitors for the highest honors of their profession, at present, alas! limited to the self consciousness of being qualified to perform with ability and propriety, what they are called upon by the wants of society to undertake.

The Philadelphia College of Pharmacy is provided with an ample chemical apparatus for the illustration of lectures, a cabinet of specimens of the Materia Medica, and a well selected library of medical and chemical books, of the use of which, the pupils of the members are allowed to avail themselves. The only courses of lectures delivered in this institution, have been upon Pharmaceutic Chemistry and the Materia Medica.

A chair of Botany was established, but I believe a class was never formed. It is much to be regretted that this science, of such vast importance to the practical pursuit of the profession of pharmacy, has not hitherto been cultivated to the same extent, as the other sciences embraced in the education of a finished pharmaceutist.

To obtain the Diploma of this College it is necessary that the Candidate should have attended two courses of lectures; have written and defended a thesis; have passed an examination by the Professors, and a committee of the Trustees; have

served an apprenticeship with a member of the College of at least four years;* and have sustained a character of moral worth, industry and intelligence with his preceptor. No advantages or privileges have been extended by the laws, to the members or graduates. Competition exists to an unlimited extent, and fortunately for society has, within a few years, been directed to the improvement of formulas, and the selection of the best qualities of medicines, rather than to its universal tendency, the mere cheapening in price. Many of the preparations of the present National Pharmacopœia owe their origin, or important modifications, in the mode of preparation, to the members or graduates of this College. The College is possessed of a Hall, in which its meetings are held, and Lectures delivered.

Of the College of Pharmacy of the City of New York, I have not been able to obtain so much information.—Its formation was the result of voluntary action and association among the druggists of that city, which was brought about by the same praiseworthy objects, which had induced the establishment of the Philadelphia college.

The charter declares the objects to be "for the purpose of cultivating, improving and making known a knowledge of Pharmacy, its collateral branches of science, and the best mode of preparing medicines and their compounds; and of giving instruction in the same by public lectures." The Diploma of this college can only be obtained by those who have attended two courses of lectures of the college, and have studied four years with a respectable druggist or apothecary, and

* It is stated in a "Note upon the state of Pharmacy in the United States" by M. Fontenelle, contained in a recent number of the *Journal de Chemie Medicale*, that the time of apprenticeship is limited to one year. We would wish our transatlantic friends to understand that this is an error, as will be perceived from the above exposé. It must have arisen from the difficulties under which Don Ramon de la Sagra laboured, in obtaining information upon the subject, viz. those attendant upon an imperfect knowledge of our language. From his book, the information in the note is professedly taken.—Ed.

shall have undergone a satisfactory examination by the trustees assisted by the professors. A thesis to be prepared by the candidate himself shall also be deposited with the college. In 1832 the number of members by their printed catalogue, was upwards of seventy, which has doubtlessly increased; but I have no means at hand to ascertain the present number. An effort was made during the last year to raise funds sufficient for the erection of a suitable building, and the purchase of apparatus, &c. in order that the view of its enlightened and philanthropic founders might be carried out. The number of graduates up to March 1835 had been fifteen. By a law of the State of New York passed in 1832, no person after the first of January 1835, is allowed to commence or practise the business of an apothecary in the city of New York, without having qualified himself to obtain the diploma of this college, or having obtained that from some other regularly constituted college of Pharmacy or medicine; or having been examined by the censors of one of the county medical societies, and been furnished by them with a certificate of his qualifications for the business of an apothecary. By another law no person is allowed to sell arsenic, prussic acid, or any other substance usually considered poisonous, without endorsing on it the word Poison, in a conspicuous manner. Tartar emetic is also required to be conspicuously labelled. This is the only law on this subject that I am aware of, in any of the United States.

Among the benefits derived from the labours of these colleges may be stated, that several years since Committees were appointed to investigate the formulæ employed in the preparation of the old English patent medicines, whose labours resulted in the substitution for the vague and various recipes employed, of formulæ based upon a scientific arrangement and disposition of the ingredients; and a suggestion to discard the marvellous details of cures with which the envelopes or directions were laden, substituting in their place a narrative more candid and ingenuous. Reforms are gradually progressing in other branches of the profession, which the former debased state of the art

rendered highly necessary; and the veil of mystery in which all pharmacy was hitherto shaded, is beginning to be raised from the compounds and manipulations of the enlightened American pharmaceutist. The practice of prescribing medicines for the sick, by the apothecaries where the reform is progressing, seldom occurs. They are not qualified by their education to undertake so responsible a duty; and it is chiefly if not solely limited to those who are actuated by the "*auri sacra fames*," rather than the wish to rely for their support upon the moderate compensation allowed by public opinion, for their services, rendered in the exercise of a liberal profession.

The practice of vending empirical nostrums, or rather that of acting as agents for their inventors, unfortunately exists to too great an extent, even among those whose education and standing should teach them to consider these *opprobria* of the healing art, beneath their notice. In a few establishments a stand has been taken; and it remains to be seen, whether well educated, scientific apothecaries will allow their reputations and standing to become subservient to the avaricious purposes of charlatans and quacks.

In the department of Medical Jurisprudence, the members and graduates of one of our colleges have been representatives of their profession; and it is gratifying to know that a class of young men is rising in the country, competent in chemical proficiency at least, to solve the doubts, which often embarrass the administrators of our criminal laws.

It cannot be expected that this department of medico legal science in its boundless scope should receive many laborers from the pharmaceutists of the country; of many of the details necessary for an expert toxicologist they are of course ignorant, nor can they be expected to be found qualified for the investigation of anatomical and physiological phenomena; but so far as nicety and accuracy in chemical research are requisite, or readiness in manipulation indispensable, I hazard the opinion that the graduates of our colleges of Pharmacy may be trusted.

Finally it may be said that like every thing else in this country, the profession of Pharmacy is on the high road of improvement; and that future generations will find established a class of scientific pharmaceutists, qualified to meet the exigencies of society in this most important branch of the social economy.

BALTIMORE Nov. 18th 1836.

ART. XLVI.—MEDICO BOTANICAL NOTICES. NO. XII.

Cocculus crispus. An extract prepared from the root of the plant thus denominated, has been brought to this country from China, by Dr. Earle. It has a dark shining appearance, a tarlike consistence and an intensely bitter taste, not unlike the Extract of Colomba, to which it is allied in sensible properties; and the resemblance between them can be readily understood, when the close alliance between the C. crispus and the C. palmatus is adverted to. This preparation like that from Colomba, possesses tonic and invigorating effects upon the stomach and bowels; and it may also possess some astringency. Dr. Earle informed us, that it had been of late years much employed in India for these purposes. It was given in mild cases of Intermittent fever, and at the termination of Dysenteric and other complaints of the bowels for the purpose of restoring their tone and power. And with the same indications it might be employed in the United States. The dose is from 5 to 10 grains repeated several times daily.

The Cocculus crispus, is the Menispermum *tuberculatum* of LAMMARCK, and the M. *verrucosum* of ROXBURGH. It was called Funis felleus by RUMPHIUS, and has been transferred by DECANDOLLE to the genus Cocculus. The plant is frutescent, smooth, twining, and sarmentose in habit, having a tuberculated stem which gives it a rugged appearance. The

leaves are petiolate, cordiform, acuminate, and glabrous; the flowers are lateral, slender and filiform, in lax spikes.

Achras sapota. This plant is also denominated, El Nispero. EMPSON states that it is very abundant in South America, and the fruit is one of the best which the country produces. It is the size of an apple, of an oval figure, the rind brown and somewhat rough; the pulp is white, very sweet and resembles in taste the bergamot pear. It has only three long seeds. The fruit is so wholesome, that it is usually given to the sick to procure an appetite; it is reckoned among the astringents. The tree is large and bushy, and bears fruit during the whole year. The wood is held in great esteem, and is of a tobacco colour inclining to purple. It is capable of receiving a good polish, and is so hard as to be used for pegs, as a substitute for nails to fasten boxes. The leaves of the Nispero are also astringent, and a decoction of them is used for inflammation of the throat. In some parts, they call this tree *Chico Sapote.* The fruit is always eaten raw.

The genus Achras belongs to the family Sapoteæ, and Hexandria Monogynia, of LINNÆUS. The seeds of the A. sapota is said, by LINDLEY, to be aperient and diuretic. They are endowed with an agreeable aromatic resinous substance, to which these effects are referable. The fruit also, according to JAQUIN, is capable of curing strangury, disury, &c. The plant abounds in a lactescent juice, which, unlike that of other families possessing it, is bland and mild in its properties. From the hardness of the wood it is near to the Ebony tribe, with which it has some botanical affinities.

Theobroma Cacao. According to EMPSON, there are two kinds of Cacao, the one wild and bitter, which the Indians used to prize highly, and as it is still in some repute, they endeavour to cultivate and improve it; the other is distinguished by its quality, according to the soil and climate in which it grows. The best Cacao is produced in the province of Seconusco, but the produce there is so small that it barely sup-

plies the people of property in the neighbourhood. The second in point of excellence grows in Guatemala, the third is from Motina, in the same province. Caraccas, Guayaquil, and Europe, are chiefly supplied from thence.

The butter which exudes from the Cacao is very fresh, and is applied to various purposes in medicine.

J. C.

SELECTED ARTICLES.

ART. XLVII.—ANALYSIS OF THE ROOT OF RHEUM AUSTRALE, CULTIVATED IN THE VICINITY OF PARIS. By M. Ossian Henry.

The rhubarb root, which is brought to us by commerce from various localities, and particularly from Tartary, Persia, and China, has been attributed to several species of the genus Rheum; whether the plant which furnishes it has really been cultivated in these countries, or whether it is introduced into them by traffic.—Thus, it had been at first supposed that rhubarb was derived from the Rheum *undulatum* and *compactum;* but by M. Guibourt, who has bestowed considerable attention upon its origin, it has been attributed to the Rheum *palmatum*. This opinion seems to be well founded, especially as regards the roots which come from Tartary, and which are known under the name of Russian rhubarb; it is now the belief that a large part of the rhubarb which is obtained from Persia and China, is to be referred to the Rheum *australe*. Many agriculturalists have endeavoured, within a few years, to acclimate in France the different species of Rhubarb, such as the *compactum*, *undulatum*, *rhaponticum* and *palmatum*. There are now establishments in the department of Morhiban at Rheumpole, where this cultivation is still going on; but as the value of the products is less regarded than their quantity, it is to the three first species that attention has been more particularly directed. May it not be from this cause that results so little satisfactory have been as yet obtained? The Rheum palmatum has also been the object of different attempts, not altogether unsuccessful, and from the analyses made by M. Guibourt upon the root of this vegetable, it ap-

peared to him that the results had a close analogy with those obtained from an examination of the exotic articles from China and Russia; which is strong corroboration of his opinion with respect to the origin of the latter. As the Rheum australe had attracted the attention of naturalists, it was of importance to experiment upon its cultivation in France. M. Merat, a member of the Royal Academy of Medicine and a distinguished physician, has prosecuted this task with peculiar diligence, and was enabled some time back, to present to this learned body many specimens of the recent roots of the Rheum australe, raised near Paris.

Having been requested to make an analysis of these roots, I have bestowed especial care upon the undertaking, which, in my estimation, was of importance; and, with the hope that the results will not be uninteresting to pharmaceutists, I have determined to publish them.

Before entering upon the subject, I shall present a short notice of the numerous publications upon the rhubarb from China and Russia, by MM. Henry, sen., and Guibourt, Shrader, Brandes, Caventou, Peretti, and finally by Hornemann, whose more recent experiments will be of service to me, in the way of comparison. Upon examining the results obtained by these authors, it will be perceived that they exhibit little agreement; but a reason for the differences between them can be advanced, by supposing that on the one hand the specimens of rhubarb analyzed, had not been identical, and on the other, that the methods of analysis pursued, had not always been the same; hence marked dissimilarity in the isolated products naturally occurred. It is moreover known, that many of these products are complex, and result from the union of several others; it is therefore easily understood why they are more readily separated from each other by one method, than by another; and how it is that in one analysis, it may be the yellow resin which predominates, whilst in another, it may be a bitter substance, or a principle analogous to gum, &c. Sometimes we meet with the oxalate of lime, as one third component of the rhubarb, whilst at others this salt is not de-

tected in larger proportions than 3 or 4 per cent. To these let us add, the necessity which exists of a perfect comprehension of what is meant by the terms, *resin, yellow matter, bitter of rhubarb, rheine, rhabarbarin, rhabarbarine* and *caphopicrite*, &c., by which the different products are designated.

1st. The *yellow matter*, the *rhabarbarin* and *rheine* appear to be the same substance, in a greater or less degree of purity.

2d. The *bitter resin*, the *bitter of rhubarb*, the *rhabarbarine*, and the *caphopicrite* may easily be confounded, especially, as Caventou observes, if this bitter matter is nothing else than a mixture of the preceding yellow resinous substance and a bitter principle, soluble in water; a compound, which from its properties is no longer similar to the yellow resin, but possesses particular characters.

3d. Furthermore, many experiments detect gum, or a substance which resembles it in character so much, as to lead to the belief, that it is more or less pure, according to the chemists who have obtained it.

4th. Finally—it is lignin, and not pectin, which has been supposed to exist in the insoluble part, and which Hornemann has isolated under the name of *matter extracted by potassa.*

These propositions established, I can now pass to the chemical analysis which I have made of the roots of the Rheum australe, cultivated near Paris.

Examination of the roots of indigenous Rheum australe.

Physical Characters. The recent roots of this vegetable were all extremely healthy, but of a size which evinced that they had not received, either from the age of the vegetable, or from the soil or climate in which they had grown, all the developement manifested by the rhubarb roots met with in commerce. They were only as large as the two fingers,—and of an elongated cylindrical form; of a brown colour externally, and marbled orange-yellow internally; they were surrounded by a thin cortical portion, easily separated; they

possessed a sensibly aromatic smell, and a taste, mucilaginous at first, then bitter, nauseous and astringent, similar to that of common Rhubarb; the saliva was tinged yellow when they had been chewed a few moments.

The roots of which we speak were grated, reduced to small fragments and then dried by a stove to reduce them to a state of pulverization. This powder when well desiccated had nearly the same colour as that of China rhubarb; it was submitted to the following analytical treatment:

Analysis of the root of the indigenous Rheum australe.

Preliminary experiments. Thirty two grammes were treated to exhaustion by hot alcohol, then by tepid water; the clear liquids mixed and submitted to slow evaporation, became more and more turbid, and when reduced to the consistence of an extract, a brown product was obtained, partly soluble in water and weighing 13. 2 grammes. This extract, tested by litmus paper, showed evidence of acidity; it produced the deepest black with the per-salts of Iron, it formed a precipitate with gelatine, and it contained a pretty abundant calcarious salt which must be a supermalate of lime. The portion not acted upon by alcohol and water contained the oxalate of lime, traces of the sulphate and phosphate of the same base, a little iron, and lastly lignin and pectin.

The powder, subjected in a crucible to a moderate heat, soon emitted a yellow aromatic vapour, which collected in the mouth of a funnel, and attached itself in the form of a yellow powder, easily fusible at a high temperature into a kind of brown oily liquid. This is the substance which constitutes the colouring matter of the rhubarb.

Analytic experiments. 1. One hundred parts of the powdered indigenous rhubarb were treated without heat in the apparatus for displacement by pure sulphuric ether, until this menstruum ceased to become yellow. After the distillation of the etherial tincture, continued until three fourths had passed over, there remained a deep brownish yellow liquid, which

placed under the receiver of an air pump, left a deep yellow residuum in the form of lamellæ, or of minute scales having a crystalline aspect.

This residue weighed 7.3 grammes, it constituted the yellow matter, or the *yellow resin*, the *rhabarbarine* or *rheine*, of some chemists.

Traces of rheine with fixed oil. This product dissolved in boiling water, became turbid when cooled, and formed a yellow powder. It volatilized in the form of vapour, or aromatic yellow fumes, its taste was styptic, pungent rather than bitter; dissolved in sulphuric ether or alcohol, it produced golden yellow solutions, and left upon blotting paper a stain which could not be totally removed by heat, and which was due to a small quantity of *fixed oil.*

Note. I am at a loss to know if there exists with the colouring matter a volatile oil, which gives it the aromatic odour; or whether this odour belongs really to the rheine itself.

This yellow matter is but slightly soluble in sulphuric, acetic, and muriatic acids. Treated by boiling nitric acid, it undergoes alteration, and produces a brownish yellow substance, which contains no oxalic acid, and is but partially soluble in water. The action of soda, potassa, and ammonia upon rheine is marked; they dissolve it, and afford solutions of a beautiful reddish purple colour, which probably may be useful in dyeing. If these purple solutions are saturated with an acid, the liquid assumes a yellow colour, thickens, and throws down yellow flocculi.

The aqueous solutions of rheine produce with

Hydrochlorate of baryta	a yellowish precipitate,
Acetate of lead	a rose coloured precipitate,
Per-muriate of iron	a black colour,
Protochloride of tin	a yellowish white deposit,
Alum	a yellow tint.

2. After the treatment by ether, I submitted the powder to the action of alcohol and pure cold water. In the second in-

stance, the vegetable substance was considerably swelled, and its appearance became gelatinous. When the liquors had been strained, which required considerable time, on account of the viscidity of the magma, I united the whole and evaporated with care; during the operation there was separated a brown pulverulent substance, hardly soluble in water, which, separated by the filter and dried, weighed 5 grammes; and which when examined, was found to contain tannin; this I believe to be what Hornemann has named *apotheme de tannin.*

Apothema of tannin, (oxygenized extractive). The clear liquor was concentrated at 100° upon a disk, to an almost dry extract, and as friable as possible; this extract was acid; submitted to alcohol at 35°, it separated into two portions; one of them which was flocculose, contained some traces of *apothema*, and of supermalate of lime, together with a mucilagenous substance which has been called *gum;* this combination weighed 1.6 grammes; the other soluble in the alcohol, contained a little tannin, and probably gallic acid, besides a bitter nauseous brown matter, which being as much dried as practicable, weighed 14 grammes; this is what has been designated by the names *caphopicrite*, and *rhabarbarine*, a complex product, as has been supposed by M. Caventou; in it exists rheine associated with one or more substances. To isolate that colouring part of the resin which constitutes this kind of combination, I have treated it several times over with an alkaline solution. The menstruum at first became reddish purple, and threw down a dirty brown flocculent deposit, soluble almost entirely in boiling alcohol, but the amount of it was exceedingly small. I may state moreover, that when the alkaline liquids are not too weak, the mixture produces an entire solution.

Sugar? I believe that there also exist traces of sugar in rhubarb, for the part which contains the caphopicrite, exhibited upon admixture with yeast, the appearance of fermentation.

3. I submitted to the action of boiling water, the root exhausted by the preceding operations, while it was still soft; the liquor when filtered had little colour; it evinced, when tested

by iodine, the presence of a considerable quantity of *amidon;* upon precipitating this liquor when concentrated, by alcohol, it was separated into a flocculent magma, which when dry, was not pulverulent, but existed in the form of a gummy coating, and weighed about 2 grammes: the amylaceous matter doubtless had been modified in this operation.

4. It only remained to investigate the composition of the insoluble residue, in which I had already ascertained the existence of oxalate of lime and of phosphate and sulphate of the same, besides lignin or ligneous fibre, and pectin, with pectic acid. I separated this insoluble residue, which was dry, coriaceous and brown, into two equal portions, A and B.

Operation A.—The coriaceous matter, calcined strongly in a platina crucible, gave off empyreumatic fumes, associated with products slightly azotized. The residue of this prolonged calcination was of a dirty white colour; treated with diluted muriatic acid, a rapid disengagement of carbonic acid took place, mixed with traces of hydrosulphuric acid, due to the small quantity of sulphate which the carbon had decomposed; the liquor being filtered and neutralized by an excess of ammonia, let fall a precipitate of phosphate of lime, and oxide of iron 0.25; filtered anew and oxalate of ammonia being added, an oxalate of lime was obtained, which when dry, weighed 3.3 grammes, the weight being doubled, since but half the coriaceous residue was used.

Operation B.—In order to convince myself of the presence of oxalic acid in the organic salt which the heat had decomposed in the preceding experiment, I reduced the coriaceous deposit into a sort of pap, by means of hot distilled water. I then mixed it with a small quantity of bicarbonate of potassa, and heated it to boiling. The mixture when filtered, produced a rose-coloured liquid, from which the addition of an acid separated gelatinous flocculi of pectic acid; filtered anew, the neutral acetate of lead was added to the liquid portion. The white precipitate being washed and treated in a capsule by sulphuric acid, produced, after several days, crystals of oxalic acid, easily to be recognised and most unequivocal.

With regard to the insoluble gelatinous residue, when dry

it weighed 21.3 grammes and must be formed entirely of ligneous fibre.

If we now compare these results with those presented by Hornemann, with respect to the exotic rhubarbs of China and Russia, we shall have the following table:

Comparative Table of the Analyses of Indigenous and Exotic Rhubarb.

Root of the Rheum australe. By O. Henry.	*Quantity*	*Russian Rhubarb.* By Hornemann.	*Quantity*	*China Rhubarb.* By Hornemann.	*Quantity*
	Gramm.		*Gramm.*	*Gramm.*	*Gramm.*
Rheine, (rhabarbarin, yellow matter.)	7.30	Yellow matter.	9.58	do.	9.16
Fixed oil, traces, bitter of rhubarb, (caphopicrite, rhabarbarine.)	14.	Bitter matter.	16.04	"	24.75
Apothema of tannin.	5.00	Apothema of tannin.	1.45	"	1.25
Extract with tannin and gallic acid.		Extract with tannin.	14.	"	16.45
Gum or mucilaginous matter.	1.60	Gum.	10.	"	
Supermalate of lime.					
Sugar, traces.					
Amidon.	2.				
Oxalate of lime.	3.30	Oxalate of lime.	2.04	"	1.30
Phosphat. lime / Sulphat. lime / Oxide of iron.	.50				
Pectin and Pectic Acid.*	46.				
Ligneous fibre. / Moisture. / Vegetable Albumen.	20.30	Matter extracted by potassa.	28.3	"	30.41
		Ligneous fibre.	13.58	"	15.41
		Humidity; loss.	4.38	"	3.73
Total,	100.00	Total,	100.00	Total,	100.00

* If this substance predominates much, it is owing, probably, to the less degree of developement of the root; whilst in the exotic plant, it has, from its more mature age, been changed in part to oxalic acid.

China Rhubarb. Henry, sen. and Guibourt.		*Russian Rhubarb.* Henry and Guibourt		*Russian Rhubarb.* Shrader.		*Rheum palmatum.* Shrader.		*China Rhubarb.* Brandes.	
	Gramm.		*Gramm.*		*Gramm.*		*Gramm.*		*Gramm.*
Yellow resin,	16.	. . . . .	17.	Resin (yellow matter,)	4.8	. . . . .	2.8	Resin,	10.
Tannin, Bitter of Rhubarb, Malic acid, Resin dissipated, Fixed oil,	23.64	. . . . .	23.8	Bitter of rhubarb	26.8	. . . . .	24.	Bitter of rhubarb, Tan. & gallic acid,	26.
Surmalate of lime, Gum,	6.	. . . . .	5.5	Oxalate of lime,	4.5	. . . . .	9.	Malate of lime,	6.5
Amidon,	9.86	. . . . .	11.	Lignin,	49.1	. . . . .	47.	Lignin,	22.3
Oxalate of lime,	32.50	. . . . .	28.6	Loss,	2.	. . . . .	2.4	Moisture,	3.2
Lignin,	12.03	. . . . .	14.1			. . . . .			
Total,	100.00	Total,	100.00	Total,	100.00	Total,	100.00	Total,	100.00

Recapitulation. It will be seen from an examination of this table, that the analysis of the indigenous rhubarb, has some analogies with that of the exotic articles, especially if the fact be taken into consideration, of the little developement attained by the vegetable in the first attempts at cultivation, which have been made in a soil and climate as yet little congenial to it. By an examination also of the analyses of MM. Henry, sen. and Guibourt, and by recollecting the great proportion of amidon and oxalate of lime, which in the process of vegetation have taken the place of the larger part of the pectic acid, found by myself, we arrive at a similar approximation; furthermore, the relation between the amount of the bitter matter, the tannin, the supermalate of lime &c. and the corresponding substances in the analysis alluded to, is also extremely close. We have then reason to hope, that the cultivation of the Rheum australe will be attended with good results from new attempts and well directed attention. Its naturalization ought to become advantageous, as well in a medical, as in an economical point of view, since it is ascertained that, in England and India, the colouring matter of the rhubarb root is used in dyeing. We much desire that M. Merat, and others who are employed in the effort to introduce exotic vegetables would turn their attention to this important plant.

ART. XLVIII.—ON THE BLEACHING COMPOUNDS OF CHLORINE. By M. MARTINS, professor of chemistry, University of Louvain.

[*Translated by William W. Smith.*]

In January 1834, I addressed to the Royal Academy of Sciences and Belles-Lettres of Brussels, a memoir on the soluble chlorides of oxides, in which, after having discussed the relative worth of several processes recommended for the preparation of chlorate of potassa,* I endeavoured to prove that the bleaching chlorides of oxides ought to be considered simple compounds of chlorine with oxibases.

A short time after, M. Balard of Montpellier having also investigated the composition of these chlorides, arrived at results which induced him to conclude that these compounds were mixtures of metallic chlorides and hypochlorites, salts of an oxacid of chlorine, to which the chlorides owed their distinguishing properties. This was a confirmation of the opinion first advanced by Berzelius, and adopted by many celebrated chemists. This opinion was at first only founded on the analogy thought to exist between the reactions of chlorine and sulphur with the alkaline oxides, and among the experiments adduced by Berzelius in support of it, there is not one which cannot be as well explained by the old theory according to which these compounds are unstable combinations of chlorine with metallic oxides. This I think was proved in

* I then proved that the formation of chlorate of potassa, by passing a stream of chlorine through a concentrated solution of caustic potassa, was merely the result of a spontaneous decomposition of the chloride of potassa previously formed, a decomposition to be attributed solely to the insolubility of the chlorate resulting from it; and that when it is wished to prepare chlorate of potassa by double decomposition from chloride of lime, and chloride of potassium, the chloride of lime should not (as Liebig has recommended) be heated until it loses all its bleaching power; for by this process two thirds of the chloride of lime, would be converted into chloride of calcium, which can have no agency in the production of the chlorate.

my memoir already alluded to;* in it I showed that the properties of the chlorides of oxides could be even more satisfactorily explained by the old, than by the new hypothesis. The latter has since acquired much weight from the experiments of Balard, which rendered it more probable, and seemed to have overthrown all the arguments I had brought forward, in support of the old theory of the composition of these chlorides. At that time it appeared, that Berzelius' theory would be pronounced the true one and be adopted by all chemists. But by a repetition of Balard's experiments and an extension of my first work on the compound which chlorous acid† forms with alkaline oxides, I convinced myself that the consequences which Balard has deduced from his experiments, as to the composition of the bleaching chlorides, are not exact, and that they should still be considered simple compounds of chloride with metallic oxides. In order to elucidate the question, I will divide my memoir into three parts. In the first, I will give a brief sketch of the oxygenized compounds of chlorine; in the second, I will point out the principal properties of the chlorites, and the manner of preparing them; in the third, I shall treat of the hypochlorites in their relations with the chlorides of oxides, and will show that these salts, as well as the chlorites, are entirely distinct from the bleaching chlorides.

I. *Sketch of the Oxacids of Chlorine.*

We are indebted to the last works of Balard for a knowledge of four definite compounds of chlorine and oxygen, all of which are acid, and may be compared in composition to the oxacids of sulphur; for we have

Hypochlorous acid	$Ch^2\ O$	Hyposulphurous acid	$S^2\ O^2$
Chlorous acid	$Ch\ O^2$	Sulphurous acid	$S\ O^2$
Chloric acid	$Ch^2\ O^5$	Hyposulphuric acid	$S^2\ O^5$
Perchloric acid	$Ch^2\ O^7$	Sulphuric acid	$S\ O^3$

Hypochlorous acid, although offering the same composition

* Published in volume 10 of the Prize Memoirs of the Royal Academy of Brussels.

† The bioxide of chloride of some chemists.

as the pretended protoxide of chlorine of some chemists, is a very dissimilar compound, as Balard has proved beyond all doubt. As to the protoxide of chlorine discovered by Davy, it is no more than a mixture of chlorine and chlorous acid; which is proved by the action of water and protochloride of mercury on it, these agents separating the two mixed gases; and also by the unusual contraction of one sixth of the volume of its component gases, which this compound would offer. The following formula will express the reaction by which the gas is produced:

$2KO, Ch^2O^5 + 12HCh = 2KCh^2O + 6H^2O + 6Ch^2O = 2KCh^2 + 6H^2O + 3ChO^2 + 9Ch.$

Thus the pretended protoxide of chlorine, resulting from the reaction of chlorohydric acid on chlorate of potassa, may be considered nothing more than a uniform mixture of one volume of chlorous acid gas ChO^2 and three volumes of chlorine. This supposition accounts not only for the constancy of the composition of the protoxide, (which has led many to consider it a definite compound,) but also for the contraction of one sixth of the total volume of its constituent gases, for in a volume of chlorous acid gas, there is a contraction of one third of the volumes of its component gases; therefore in an invariable mixture of a volume of this gas with three volumes of chlorine,there should be a contraction of one sixth of the total volume. This contraction confirms what the experiments of Soubeiran had already proved, that Davy's protoxide of chlorine was but a mixture of chlorine and chlorous acid gas. The second oxygenized compound of chlorine, that which is procured by the action of sulphuric acid on chlorate of potassa, by the process of Count Stadion, is also evidently an acid; 1st, because it neutralizes completely the soluble alkaline oxides; and 2d, because, according to the electro-chemical theory, it is impossible that an oxide of chlorine, more highly oxygenized than hypochlorous acid, can possess the properties of an acid in an inferior degree to it. We will therefore continue to call this gas chlorous acid, and its salts with basic oxides, chlorites.

Chloric acid may be compared to the hypophosphoric and hyposulphuric acids. It should be called hypochloric acid, reserving that of chloric acid, (conformably to the rules of the nomenclature,) to the most highly oxygenized, and, at the same time, most stable of these compounds of chlorine, now improperly called perchloric acid. In fact, as hyposulphuric acid is decomposed into sulphurous and sulphuric acid, so chloric acid, by heat or even by keeping a long time at the ordinary temperature, is converted into chlorous and perchloric acids; a very slight increase of temperature suffices to develope in it a strong odour of chlorous acid gas and a yellow colour, owing to the solution of the gas in the remaining liquid. The analogy between the oxacids of chlorine and those of sulphur would be perfect, were the composition of perchloric acid Ch^2O^6, as M. Gay Lussac at first concluded from the reaction which produced it. All the phenomena attendant on the production and action of this acid, can be more satisfactorily explained, by supposing its atomic composition to be Ch^2O^6. A repetition of the analysis of this acid compound would be interesting, as it does not appear to have been made with the rigour calculated to inspire entire confidence.*

II. *Of the Chlorites.*

The chlorites, or more or less neutral compounds of chlorous acid with basic oxides, and of which I first proved the existence in my paper already referred to, are salts of little stability, as might be expected, as well from the weak acid properties of their acid, as from its instability. They are more stable than Balard's hypochlorites, and are not decom-

* According to the analysis of Count Stadion, perchlorate of potassa loses 44 per cent. by its decomposition. Now, if we suppose the composition of its acid to be $Ch^2 O^7$, it should lose 46.18 per cent.; and, on the other hand, it should lose 42.88 per cent., allowing it to be composed of $Ch^2 O^6$. The latter number approaches nearer to the analytical result, especially when we take into consideration the fact that some undecomposed salt is carried over by the evolution of the gas, as was observed by the Count. TRANSLATOR.

posed by slight elevations of temperature; they give precipitates with nitrate of silver; they give off chlorous acid gas with brisk effervescence, when treated by the mineral acids and by some organic acids; this is their characteristic property. Those which I have examined are all soluble in water; they are the salts of potassa, soda, baryta and lime. They may be procured without difficulty, by passing a current of the gas (generated by Count Stadion's process) through solutions of the first three bases, and through a milk of lime. By continuing the operation until the liquid ceases to absorb the gas, solutions are obtained which are perfectly neutral, possess great bleaching power, and are decomposed with evolution of chlorous acid gas, by the addition of even a diluted acid. The products thus obtained, were thought by Berzelius to be solutions of a mixture of chlorides and chlorates; but, if we make a strong solution of a chloride and chlorate, and saturate it even with chlorous acid, and then treat it with an acid, no appreciable quantity of chlorous acid is evolved: a proof that the solutions procured as above are really compounds of chlorous acid and alkaline bases. It was thought that chlorites did not exist, because during the saturation of a concentrated solution of potassa by chlorous acid, a large quantity of chlorate of potassa subsides, and chloride of potassium remains dissolved. But these salts are formed only when the solution is charged to a certain degree with the chlorite, and their formation is the result of the insolubility of the chlorate in the quantity of liquid operated on; for it does not take place when we saturate a milk of lime, or a solution of one part of potassa in thirty of water, with chlorous acid. We can obtain a more concentrated solution of chloride of potassa than of chlorite of potassa, because the spontaneous decomposition of the latter gives rise to a proportionally greater quantity of chlorate, as will be seen hereafter. As the chlorate of soda is much more soluble than that of potassa, we should be able to obtain a stronger solution of the chlorite of soda than of that of potassa, which is the case; for, having passed chlorous acid gas into a solution of one part of soda in five or six of water, until the

gas was no longer absorbed, I obtained a neutral, bleaching liquid, from which no salt was deposited, and which contained such a quantity of chlorite, that a few drops of it into which was poured a drop of sulphuric acid, evolved so much chlorous acid gas, as to produce a powerful explosion by its decomposition. There exist both neutral and alkaline chlorites. When we pass chlorous acid gas into an alkaline solution, it is at first absorbed without colouring the liquid, which retains its alkalinity, and from which, though very concentrated, no chlorate is deposited. This alkaline chlorite does not bleach without the intervention of acids which evolve from it much chlorous acid. Its solution may be concentrated in vacuo, or by a gentle heat, without being decomposed, and the salt obtained in a solid state. I have even procured the chlorite of potassa in the form of delicate lamellar crystals, resembling the chlorate, but distinguished from it by the effervescence (due to the escape of oxide of chlorine) produced by the action of sulphuric acid, diluted with ten times its weight of water; an acid which does not decompose the chlorate. The solution of this chlorite may be preserved any length of time, if kept from the air; in a solid state the salt may be exposed to the air without decomposition, provided the atmosphere is not sufficiently moist to cause deliquescence, and thence absorption of carbonic acid.

When chlorous acid gas is passed into a solution of alkaline chlorite of potassa, or a solution of potassa, until it is no longer absorbed, there is a point when the liquid commences to be coloured; at that time it loses its alkalinity, and soon deposits a large quantity of chlorate of potassa, provided the solution be strong and the gas continues to pass into it; but if the solution be weak, we have a neutral bleaching chlorite without formation of chlorate. This neutral solution is capable of absorbing an additional quantity of chlorous acid, and becomes of a dark yellowish brown colour; but by exposure to the air, or to a temperature of 80° Cen., it loses this excess of acid: this temperature, if prolonged, decomposes all the chlorite with formation of chlorate and chloride.

As the solution of neutral chlorite of potassa cannot be concentrated without decomposition, its spontaneous evaporation should produce formation of chlorate and chloride. In fact by allowing it to evaporate at the common temperature, under a large receiver in the presence of quicklime, I obtained a residue of chlorate and chloride nearly in the ratio of six parts of the former, to one of the latter, which induces me to believe that the neutral chlorite of potassa, has the following composition:

$$Ch^2O^4, KO,$$

whence

$$6Ch^2O^4KO = 5Ch^2O^5KO + Ch^2K;$$

a formula which represents the results, and shows that for each atom of chloride, there are five of chlorate formed; the increase of the result of the decomposition of the chlorides of oxides. All the neutral chlorites that I have examined, submitted to evaporation in the manner above described, leave a residue destitute of bleaching power, fusing on a live coal, and evolving chlorous acid only by the addition of concentrated sulphuric acid.

We can now understand why the alkaline chlorites are more stable than the neutral; their composition is such that they cannot produce chlorates and chlorides; for we have:

$$6ChO^2KO = 3Ch^2K + 3Ch^2O^5KO - 3Ch^2.$$

It is no doubt for the same reason that we can evaporate the alkaline chlorides of potassa and soda *to dryness* without the production of chlorates and chlorides, which are always formed by the concentration of the neutral chlorides or those which do not change reddened litmus paper to blue, or precipitate a solution of corrosive sublimate. I have shown that we can by evaporating alkaline chloride of potassa even at 50° Cen., obtain a dry, amorphous compound, which bleaches powerfully, and evolves much chlorine by the addition of the weakest acids. We thus see how many chemists have, by rapid evaporation, succeeded in obtaining a solid chloride of soda, while others have always failed in the attempt; the

former employed an alkaline chloride, the latter a neutral chloride.

The solution of chlorites with excess of chlorous acid, become after a certain time acid, and contain free chloric acid, the result of the decomposition of the free chlorous acid, which in the presence of water is converted into chlorine and chloric acid.

The neutral chlorites in solution, are partially decomposed by carbonic acid; which shows the feeble affinity of chlorous acid for bases. The decomposition however, is never complete, even when the gas is passed into a solution of chlorite of lime. The solution soon becomes coloured by free chlorous acid, which may be driven off by continuing the stream of gas a sufficient length of time; the acid being expelled, the solution loses its colour; after which carbonic acid has no action on it; the presence of undecomposed chlorite in the liquid, is easily proved by the addition of sulphuric acid, when a large quantity of acid is given off. It is probable then, that carbonic acid merely converts the neutral into alkaline chlorites, or into carbonato-chlorites.

The neutral chlorites bleach; in common with chlorine and the chlorides of oxides, their oxidizing power is great, converting sulphuret of lead instantaneously into sulphate of lead. When distilled at the temperature of their boiling points, they give off a little chlorous acid, and leave as residue a mixture of chlorate and chloride containing free alkali; owing, probably, to the escape of chlorous acid, or which may have existed in the liquid, although it could not be detected by litmus paper in the bleaching solution of chlorite.

A mixture of chlorite and chloride in solution, gives off chlorous acid when decomposed by an acid, which distinguishes it from the chlorides of oxides—which, under the same circumstances, give off chlorine; the latter are not, then, as was supposed, mixtures of chlorites and chlorides.

III. *Of the Hypochlorites.*

The hypochlorites discovered by Balard, bleach and oxidize like the chlorites; when neutral, they possess little sta-

bility; the least increase of temperature suffices to decompose them into chlorates and chlorides, oxygen gas being given off, according to Balard; when alkaline, their solutions may be evaporated without being decomposed.

They can easily be distinguished from the chlorites, by the facts, that when treated by acids they give off hypochlorous acid, either pure or mixed with chlorine, and that when previously mixed with a metallic chloride, chlorine alone is liberated from them by the action of acids; which is owing to the mutual decomposition of hydrochlorous and hydrochloric acids, as expressed by the following formula:

$$Ch^2O + 2HCh = H^2O + 4Ch.$$

The same result is not observed when mixtures of chlorites and chlorides are treated in the same manner, because hydrochloric acid has no action on chlorous acid. An analogous result is presented us in the action of acids on a mixture of chlorides and chlorates, by which chlorous acid, mixed with its own volume of chlorine, is evolved with effervescence, even at ordinary temperature; this reaction of hydrochloric and chloric acids, is expressed by the following formula:

$$Ch^2O^5 + 2HCh = H^2O + 2ChO^2 + 2Ch.$$

So that the product is a mixture of equal volumes of chlorous acid and chlorine, and not water and chlorine, as generally stated. This reaction greatly facilitates the decomposition of these salts by acids; for sulphuric acid, diluted with its own volume of water, which at the ordinary temperature has no action either on the chlorate of potassa or the chloride of potassium, decomposes them with ease when mixed as stated above. For the same reason, a mixture of iodide of potassium and iodate of potassa is decomposed by the feeblest acids, even by carbonic acid, with precipitation of iodine, as observed by Gay Lussac, the hydriodic and iodic acids mutually decomposing each other.

This property, which the hypochlorites possess, of giving off chlorine by the action of acids when previously mixed with metallic chlorides, has contributed in no small degree to strengthen the opinion, that the chlorides of oxides are mix-

tures of chlorides and hypochlorites, and that it is to the latter they owe their principal properties. But this result should no more induce us to suppose so, than the precipitation of iodine by a weak acid, from a mixture of iodide of potassium and iodate of potassa, should authorize us to confound a colourless solution of such a mixture, with an iodide of oxide distinguished from it by colour independent of other properties.

The hypochlorites even when mixed with metallic chlorides, may easily be distinguished from the chlorides of oxides, by their easy decomposition with evolution of oxygen, when heated even slightly;* this gas is never given off when chloride of potassa is boiled. The latter supports without decomposition a temperature of 50° or 60° Cen., and if it does not contain an excess of chlorine, it may even be heated beyond 80° Cen. without alteration. The hypochlorites have little stability, and in summer a few days suffice for their spontaneous decomposition; the chlorides of potassa and soda on the contrary may be preserved a long time if kept from the air and light.

The chlorides of potassa and soda, with excess of chlorine, prepared by passing chlorine through the alkaline solutions until it is no longer absorbed, possess a remarkable property which has not yet been noticed, and which cannot well be explained on the supposition of their being mixtures of chlorides and hypochlorites. When their solutions are boiled in a distillatory apparatus, they are decomposed, do not evolve oxygen or even a notable quantity of chlorine, but hypochlorous acid, which with the vapour of water is condensed in the receiver. This liquid possesses all the properties of Balard's hypochlorous acid; it has the same odour; bleaches, decomposes oxalic acid at low temperatures, with evolution of carbonic acid, liberates chlorine from chloride of sodium, and has the same action on iron filings as Balard's acid. The products of the distillation should be divided; the liquid first condensed, appears to contain free chlorine; the liquid whose properties I have just stated, is next obtained. The process should be

* Balard, Ann. de chi. et de phys. vol. 57. p. 299.

discontinued when the chloride of oxide is reduced to half its previous volume, the residue being then a mixture of neutral metallic chloride, with a small quantity of chlorate, the formation of which appears to me accidental.

When on the other hand, chloride of lime or the neutral chlorides of potassa and soda prepared from chloride of lime by double decomposition are distilled, the product is water, containing barely appreciable traces of hypochlorous acid or chlorine. The following formulæ express this difference in the results:

$$Ch^2 + Ch^2KO = Ch^2K + Ch^2O;$$

Thus the excess of chlorine by its affinity for oxygen, may favour the decomposition of the chloride of oxide, which always has a tendency to transform itself into metallic chloride and hypochlorous acid. Without the free chlorine, we could not account for the formation of hypochlorous acid; for we have,

$$2Ch^2KO = Ch^2O + Ch^2K + KO,$$

which does not express the reaction, because the residue of the distillation is not alkaline, as it should be, were the formula correct.

It is scarcely possible to explain the phenomena of the distillation of the chlorides of potassa and soda with excess of chlorine, by Balard's hypothesis; for according to it, we must suppose that the free chlorine first decomposes the hypochlorite and then reacts on the oxide thus set free, so as to form with it a metallic chloride, and hypochlorous acid, a complicated and scarcely admissible reaction.

We know too that when liquid hypochlorous acid is poured on a metallic chloride of the first section, the chloride of sodium for instance, it is decomposed with effervescence due to the escape of chlorine and there remains a bleaching chloride of soda, similar to that prepared in the ordinary way. This reaction is readily explained by the following formula:

$$Ch^2O + Ch^2Na = Ch^2 + Ch^2NaO.$$

But those who admit that the chlorides of oxides are mixtures of metallic chlorides and hypochlorites, should believe with Balard,* that hypochlorous acid is capable of decomposing the chlorides of the alkaline earths, with formation of a mixture of chloride and hypochlorite. Now, it is difficult to suppose that this acid is able to convert such fixed compounds as these chlorides into others so unstable as the hypochlorites. Besides, Balard† has observed that hypochlorous acid does not combine with peroxide of iron, while Grouvelle has announced a soluble, bleaching chloride of peroxide of iron, which has obliged Balard to consider this bleaching chloride as a mixture of hypochlorous acid and perchloride of iron, and he thus explains why it produces hypochlorous acid when distilled. But the chloride of potassa, with excess of chlorine, submitted to distillation, also gives hypochlorous acid and a metallic chloride, which should induce us to believe the two chlorides analogous in composition. I am even inclined to think that the formation of hypochlorous acid by Balard's process with oxide of mercury, is subordinate to the production of a bleaching chloride of oxide, for by agitating peroxide of mercury suspended in water, in a bottle filled with chlorine there is formed a soluble bleaching chloride of oxide of mercury, containing all the oxide, if an excess of it is not employed in the experiment and sufficient water is present. The distillation of this chloride should necessarily produce hypochlorous acid, even without the presence of an excess of chlorine; it is therefore the most suitable of these compounds for the preparation of hypochlorous acid; for we have:

$$\underbrace{2Ch^2HgO}_{\text{chloride of oxide.}} = \underbrace{Ch^2O}_{\text{hypoch's acid.}} + \underbrace{Ch^2Hg\ HgO.}_{\text{oxichloride of mercury.}}$$

As the oxichloride of mercury is almost insoluble, it may happen that, during the preparation of the chloride of oxide of mercury by the process described above, especially if a small quantity of water be used, and there be sufficient oxide

* Ann. de. Chim. et de Phys. vol. 57, p. 266. † Ibid, vol. 57, p. 296.

to neutralize the chlorine, the chloride may be decomposed as fast as it is produced, owing to the insolubility of the oxchloride which will be precipitated, while hypochlorous acid retaining a small quantity of oxide of mercury, or rather mixed with a little undecomposed chloride of oxide, will remain in solution. Hence it is evident that a solution of this chloride, sufficiently strong to undergo spontaneous decomposition, should furnish an acid much more concentrated than can be obtained from the chlorides of potassa and soda which are not susceptible of a similar decomposition.

The bleaching chlorides of the oxides of zinc and copper, prepared by saturating chlorine with the hydrated oxides of these metals, suspended in water, as indicated by Grouvelle, give by distillation the same products as the chloride of oxide of mercury, which renders it probable that the reaction in all these cases is the same.

Owing to the great solubility of the chlorides of the oxides of zinc and mercury, the salts of these oxides are not precipitated by the neutral chlorides of the oxides of the first section, as are the other metallic salts of the last four sections; hence an excellent way of ascertaining whether a solution of potassa or soda is saturated with chlorine, is to try if it is precipitated by a solution of corrosive sublimate.

Balard considers the bleaching and oxidizing powers possessed in common by the hypochlorites and chlorides of oxides as a strong proof of their identity. They both convert the recently precipitated sulphurets into sulphates, and may be substituted for peroxide of hydrogen in restoring the colours of paintings; but the chlorites produce the same effects, and yet they cannot be confounded with the chlorides of oxides.

The action of nitrate of silver on the chlorides of oxides, has been adduced in support of Berzelius' theory of their composition; on mixing the two solutions, chloride of silver is precipitated, and the liquid above it bleaches powerfully for a few moments; it soon, however, becomes troubled, owing to

the decomposition of the chlorite or hypochlorite, formed according to Balard, at the same time as the chloride, and from its instability unable to remain longer in solution, he considering the bleaching chloride of oxide a mixture of metallic chloride and chlorite; but it is more natural to admit that, by the action of the nitrate of silver, there is formed a bleaching chloride of oxide of silver, which, at the moment of its formation, is converted into chloride and chlorate, owing to the insolubility of the chloride, in the same way that chloride of potassa is decomposed into chloride and chlorate, owing to the insolubility of the chlorate.

Thus far, then, nothing has been adduced, to prove that the bleaching chlorides are mixtures of hypochlorites and metallic chlorides; on the contrary, facts seem to show that they are compounds of chlorine and basic oxides. Besides, nothing forbids us to admit the existence of such compounds; for it is not yet established that sulphur, the action of which on the oxides suggested to Berzelius his theory of the chlorides of oxides, cannot combine with oxides. I am induced to believe that sulphurets of oxides do exist, from the fact that precipitated hydrate of sulphur, at a temperature of from 10° to 20° Cen., dissolves in a solution of potassa or soda, which becomes coloured, and from which sulphur (not bisulphuretted hydrogen) is precipitated by hydrochloric acid, and without evolution of sulphuretted hydrogen. Hence, it is probable, that all alkaline sulphurets made in the wet, may contain sulphurets of oxides. The polysulphurets of potassium or calcium, prepared in this manner, should not be used to obtain bisulphuretted hydrogen; for the precipitate produced in them by hydrochloric acid consists of a mixture of much hydrate of sulphur, with a small quantity of bisulphuretted hydrogen—while the precipitate obtained from the polysulphuret made by dissolving sulphur in a monosulphuret of potassium, resulting from the reduction of the sulphate by charcoal, is pure bisulphuretted hydrogen, without admixture of an appreciable quantity of sulphur. This difference in the results, may partly be attributed to the presence of hyposulphites in the sulphurets,

made in the usual way; but it has never been demonstrated, that they exist there in sufficient quantity to account for the phenomena alluded to.

NOTE.—The preceding paper was concluded, when wishing to convince my class that the production of chlorate of potassa, by the usual process, is entirely the result of the decomposition of chloride of potassa, and owing to the insolubility of the chlorate, and not depending on the heat produced by the absorption of chlorine, as Morin* conceives, I passed chlorine through a *boiling* solution of one part of potassa in four parts of water. The gas was absorbed in as great quantity as if the solution had been cold, giving a bleaching liquid of great power, and no deposit of chlorate. The saturated solution was allowed to cool; after a certain time, a large quantity of chlorate fell, and the solution lost its bleaching power to such a degree, that a slip of reddened litmus paper could be immersed in it several minutes before it lost its colour, while a similar strip was *instantly bleached* when dipped into the hot solution; a proof that the chloride of potassa existing in the boiling liquid disappeared as it cooled, producing the chlorate, which was quite as abundant as when obtained in the usual way.

This experiment furnishes a strong argument against the theory of Balard. For, as already stated, the hypochlorites are easily decomposed by slight elevations of temperature; it is therefore impossible to admit their existence in the boiling liquid obtained as above; yet it possessed all the properties of chloride of potassa, showing that the two are distinct compounds. The solutions of chloride of potassa or soda, obtained by double decomposition from chloride of lime, may be kept in ebullition a long time without losing their bleaching power, and are only decomposed when, by evaporation, they have become so concentrated as to be unable to hold the resulting chlorate in solution.

* Ann. de Chi. et de Phys. vol. 37, p. 146.

The manufacturer of chlorate of potassa should, therefore, vary his process with the state of his solutions of chloride of potassa; if these are without excess of chlorine, as when obtained from chloride of lime, they may be evaporated at their boiling point; but if, as is usually the case, they are saturated with the gas, they should be concentrated at a temperature not exceeding 50° or 60° Cen.

ART.—XLIX.—SEPARATION OF ARSENIC. By Mr. James Marsh, of the Royal Arsenal, Woolwich.

Notwithstanding the improved methods that have of late been invented of detecting the presence of small quantities of arsenic in the food, in the contents of the stomach, and mixed with various other animal and vegetable matters, a process was still wanting for separating it expeditiously and commodiously, and presenting it in a pure unequivocal form for examination by the appropriate tests. Such a process should be capable of detecting arsenic not only in its usual state of white arsenic or arsenious acid, but likewise in that of arsenic acid and of all the compound salts formed by the union of either of these acids with alkaline substances. It ought, also, to exhibit the arsenic in its reguline or metallic state, free from the ambiguity which is sometimes caused by the use of carbonaceous reducing fluxes. It appeared to me, that these objects might be attained by presenting to the arsenic hydrogen gas in its nascent state: the first action of which would be to deoxygenate the arsenic; and the next, to combine with the arsenic, thus deoxygenated, into the well-known gas called arsenuretted hydrogen. Being thus brought to the gaseous state, the arsenic would spontaneously (so to speak) separate itself from the liquor in which it was before dissolved, and might be collected for examination by means of any common gas apparatus; thus avoiding the trouble, difficulty, and ambi-

guity of clarification and other processes whereby liquors, suspected of containing arsenic, are prepared for the exhibition of the usual tests, or of evaporation and deflagration which are sometimes had recourse to in order to separate the arsenic from the organic substances with which it may have been mixed.

I had the satisfaction of finding, on trial, that my anticipations were realized; and that I was thus able, not only to separate very minute quantities of arsenic from gruel, soup, porter, coffee, and other alimentary liquors, but that, by continuing the process a sufficient length of time, I could eliminate the whole of the arsenic in the state of arsenuretted hydrogen, either pure, or at most, only mixed with an excess of hydrogen.

If this gas be set fire to as it issues from the end of a jet of fine bore into the common air, the hydrogen, as the more combustible ingredient, will burn first, and will produce aqueous vapour, while the arsenic will be deposited either in the metallic state, or in that of arsenious acid, according as it is exposed partially or freely to the air. The former condition is brought about by holding a piece of cold window glass opposite to and in contact with the flame, when a thin metallic film will be immediately deposited on its surface; and the latter, by receiving the flame within a glass tube open at both ends, which in half a minute, will be found to be dimmed by a white pulverulent sublimate of arsenious acid. By directing the flame obliquely within side of the tube, it strikes against the glass and deposits the arsenic partly in the metallic state. In this case, if the tube, while still warm, be held to the nose, that peculiar odour, somewhat resembling garlic, which is one of the characteristic tests of arsenic, will be perceived. Arsenuretted hydrogen itself has precisely the same odour, but considerable caution should be used in smelling to it, as every cubic inch contains about a quarter of a grain of arsenic.

The requisite apparatus is as simple as possible; being a glass tube open at both ends, and about three quarters of an

inch in its internal diameter. It is bent into the form of a syphon, the shorter leg being about five inches, and the longer about eight inches in length. A stopcock ending in a jet of fine bore, passes tightly through a hole made in the axis of a soft and sound cork, which fits air-tight into the opening of the lower bend of the tube, and may be further secured if requisite, by a little common turpentine lute. To fix the apparatus, when in use, in an upright position, a hole is made in a wooden block for the reception of the lower part of a pillar, and a groove is cut in the top of the same block to receive the bend of the tube. Two elastic slips cut from the neck of a common bottle of India rubber, keep the tube firm in its place.

The matter to be submitted to examination, and supposed to contain arsenic, if not in the fluid state, such as pastry, pudding, or bread, &c., must be boiled with two or three fluid ounces of clean water, for a sufficient length of time.

The mixture so obtained must then be thrown on a filter to separate the more solid parts: thick soup, or the contents of the stomach, may be diluted with water and also filtered; but water-gruel, wine, spirits, or any kind of malt liquor and such like, or tea, coffee, cocoa, &c., can be operated on without any previous process.

When the apparatus is to be used, a bit of glass rod, about an inch long, is to be dropped into the shorter leg, and this is to be followed by a piece of clean sheet zinc, about an inch and a half long and half an inch wide, bent double, so that it will run down the tube till it is stopped by the piece of glass rod first put in. The stopcock and jet are now to be inserted, and the handle is to be turned so as to leave the cock open. The fluid to be examined, having been previously mixed with from a drachm and a half to three drachms of dilute sulphuric acid (1 acid and 7 water,) is to be poured into the long leg, till it stands in the short one about a quarter of an inch below the bottom of the cork. Bubbles of gas will soon be seen to rise from the zinc, which are pure hydrogen if no arsenic be present; but, if the liquor holds arsenic in any form in solution,

the gas will be arsenuretted hydrogen. The first portions are to be allowed to escape, in order that they may carry with them the small quantity of common air left in the apparatus; after which the cock is to be closed, and the gas will be found to accumulate in the shorter leg, driving the fluid up the longer one, till the liquor has descended in the short leg below the piece of zinc, when all further production of gas will cease. There is thus obtained a portion of gas subject to the pressure of a column of fluid, of from seven to eight inches high: when, therefore, the stopcock is opened, the gas will be propelled with some force through the jet, and, on igniting it as it issues (which must be done quickly by an assistant,) and then holding horizontally a piece of crown or window-glass over it, in such a manner as to retard slightly the combustion, the arsenic (if any be present) will be found deposited in the metallic state on the glass; the oxygen of the atmosphere being employed in oxydizing the hydrogen only during the process. If no arsenic be present, then the jet of the flame as it issues has a very different appearance; and although the glass becomes dulled in the first instance by the deposition of the newly formed water, yet such is the heat produced, that in a few seconds it becomes perfectly clear, and frequently flies to pieces.

If the object be to obtain the arsenic in the form of arsenious acid, or white arsenic, then a glass tube, from a quarter to half an inch in diameter (or according to the size of the jet of flame,) and eight or ten inches in length, is to be held vertically over the burning jet of gas, in such a manner that the gas may undergo perfect combustion, and that the arsenic combined with it may become sufficiently oxydized; the tube will thus, with proper care, become lined with arsenious acid in proportion to the quantity originally contained in the mixture.

When the glass tube is held at an angle of about forty-five degrees over the jet of flame, three very good indications of the presence of arsenic may be obtained at one operation; viz. metallic arsenic will be found deposited in the tube at the part nearest where the flame impinges,—white arsenic, or ar-

senious acid at a short distance from it,—and the garlic smell can be readily detected at either end of the tube in which the experiment has been made.

As the gas produced during the operation is consumed, the acid mixture falls into the short limb of the tube, and is thus again brought into contact with the zinc, in consequence of which a fresh supply is soon obtained. This gas, if submitted to either of the processes before described, will give fresh indications of the presence of the arsenic which the mixture may have originally contained; and it will be easily perceived that the process may be repeated as often as may be required, at the will of the operator, till no further proofs can be obtained.

When certain mixed or compound liquors are operated on in this apparatus, a great quantity of froth is thrown up into the tube, which may cause a little embarrassment by choaking the jet. I have found this effect to take place most with the contents of the stomach, with wine, porter, tea, coffee, or soup, and indeed, with all mucilaginous and albuminous mixtures. The means I adopt to prevent this effect from taking place, or, at least, for checking it in a great measure, is to grease or oil the interior of the short limb of the apparatus before introducing the substance to be examined, or to put a few drops of alcohol or sweet-oil on its surface previously to introducing the stopcock and its appendages. I have, however, found, if the tube be ever so full of froth in the first instance, that, in an hour or two, if left to itself, the bubbles burst, and the interior of the tube becomes clear without at all affecting the results.

In cases where only a small quantity of the matter to be examined, can be obtained, I have found a great convenience in using the small glass bucket. Under such circumstances, the bent glass tube may be filled up to within an inch of the short end with common water, so as to allow room for the glass bucket, which must be attached to the cork, &c. by means of a little platina wire; a bit or two of zinc is to be dropped into the bucket, with a small portion of the matter

to be examined, and three or four drops of diluted sulphuric acid (acid 2, water 14;) and the whole is then to be introduced into the mouth of the short limb of the tube. The production of gas under this arrangement is much slower, and of course, requires more time to fill the tube, than in the former case; but the mode of operating is precisely the same. Indeed, it is of great advantage, when the quantity of arsenic present is very minute, not to allow the hydrogen to be evolved too quickly, in order to give it time to take up the arsenic.

A slender glass funnel will be found of service when as much as a table spoonful, or even a tea spoonful of matter, can be obtained for examination. In this case, the tube is to be partly filled with common water, leaving a sufficient space for the substance to be examined; a piece of zinc is to be suspended from the cork by a thread or wire, so as to hang in the axis of the tube; and the fluid to be operated on, having previously been mixed with dilute sulphuric acid, is then to be poured through the funnel carefully, so as to surround the zinc, avoiding, as far as possible, to mix it with the water below, and the stopcock and its appendages are to be replaced in the mouth of the tube; the production of the gas then goes on as before stated, and the mode of manipulating with it is exactly the same as described in the foregoing part of this paper.

It will be necessary for me, in this place, to explain the methods I employ after each operation, to determine the integrity of the instrument, so as to satisfy myself that no arsenic remains adhering to the inside of the tube, or to the cork and its appendages, before I employ it for another operation.

After washing the apparatus with clean water, a piece of zinc may be dropped in, and the tube filled to within half an inch of the top of the short limb; two drachms of diluted sulphuric acid are then poured in, and the stopcock and cork secured in its place; hydrogen gas will in this case, as before, be liberated and fill the tube. If the gas as it issues from the jet be then inflamed, and a piece of window glass held over it

as before described, and any arsenic remains, it will be rendered evident by being deposited on the glass; if so, this operation must be repeated till the glass remains perfectly clean, after having been exposed to the action of the gas.

When I have had an opportunity of working with so large a quantity of mixture as from two to four pints (imperial measure), I then have employed the instrument which is, indeed, but a slight modification of one of the instantaneous light apparatuses, now so well known and used for obtaining fire by the aid of a stream of hydrogen gas thrown on spongy platinum. It will, therefore, be of importance only for me to describe the alteration which I make when I employ it for the purpose of detecting arsenic. In the first place, I must observe, that the outer vessel which I use, holds full four pints, and that the jet of the stopcock is vertical, and its orifice is twice or three times larger than in the instrument as generally made for sale, and also that there is a thread or wire attached to the cork of the stopcock for suspending a piece of zinc within the bell-glass.

With an instrument of this description, I have operated on one grain of arsenic in twenty-eight thousand grains of water (or four imperial pints), and have obtained, therefrom, upwards of one hundred distinct metallic arsenical crusts.

Similar results have been obtained with perfect success from three pints of very thick soup, the same quantity of port wine, porter, gruel, tea, coffee, &c. &c.

It must, however, be understood, that the process was allowed to proceed but slowly, and that it required several days before the mixture used ceased to give indication of the presence of arsenic, and, also, a much larger portion of zinc and sulphuric acid was employed from time to time, than when working with the small bent tube apparatus, in consequence of the large quantity of matter operated on under this arrangement.

With the small apparatus, I have obtained distinct metallic crusts, when operating on so small a quantity as one drop of

Fowler's solution of arsenic, which only contains $\frac{1}{120}$ part of a grain.

The presence of arsenic in artificial orpiment and realgar, in Scheele's green, and in the sulphuret of antimony, may be readily shewn by this process, when not more than half a grain of any of those compounds is employed.

In conclusion, I beg to remark, that although the instruments I have now finished describing, are the form I prefer to all that I have employed, yet it must be perfectly evident to any one, that many very simple arrangements might be contrived. Indeed, I may say unequivocally, that there is no town or village in which sulphuric acid and zinc can be obtained, but every house would furnish to the ingenious experimentalist ample means for his purpose; for, a two-ounce phial, with a cork and piece of tobacco-pipe, or a bladder, with the same arrangement fixed to its mouth, might, in cases of extreme necessity, be employed with success, as I have repeatedly done for this purpose.

The only ambiguity that can possibly arise in the mode of operating above described, arises from the circumstance, that some samples of the zinc of commerce themselves contain arsenic; and such, when acted on by dilute sulphuric acid give out arsenuretted hydrogen. It is, therefore, necessary for the operator to be certain of the purity of the zinc which he employs, and this is easily done by putting a bit of it into the apparatus, with only some dilute sulphuric acid; the gas thus obtained is to be set fire to as it issues from the jet; and if no metallic film is deposited on the bit of flat glass, and no white sublimate within the open tube, the zinc may be regarded as in a fit state for use.

Transactions of the Society of Arts.

ART. L.—NEW METHOD OF ADMINISTERING CUBEBS.

By M. Labelonye, Pharmaceutist, Paris.

The efficacy of the *Piper cubeba*, the stimulant virtue of which appears to operate specifically upon mucous membranes, and particularly that of the genito-urinary organs, is well established at the present day, in acute and chronic inflammatory affections of these parts.

This substance, nevertheless, is one of those to which pharmaceutical chemists have paid very little attention, and no one of them has made an attempt to render its administration more convenient, by improving the forms of preparation, while a large number of substances of less interest in a therapeutic point of view are capable of being exhibited under many forms, more or less agreeable.

It is usually administered in powder, and there is no physician who has not been embarrassed in his practice from the difficulty he has encountered in getting his patient to take a sufficient amount to render it efficient, in consequence of the repugnance and disgust created by it.

It has appeared to us that the subject was worthy the attention of the pharmaceutist, who is desirous of advancing the interests of pharmacy, and that some researches into the methods by which it could be rendered more available, would be of infinite value to the science of medicine, founded upon the power which might exist of isolating the active principles, and separating them from such as are inert, thereby saving the stomach the effort necessary to accomplish this operation.

There is another consideration, of which we have not lost sight—it is, that cubebs, like all vegetable matter, is affected by physical influences; and that it exhibits, in its chemical composition, marked differences, which render its action extremely variable. By employing, on the contrary, the active principles only, upon the amount of which depends the greater or less activity of this substance, more positive results are ob-

tained. With this design, we have undertaken to isolate these principles, and we believe that we have completely succeeded.

Our own analytical investigations, similar to those which have recently been published, have demonstrated that the *Piper cubeba* is composed of wax, green and yellow volatile oils, a balsamic resin, analogous to the balsam of copaiva, chloride of sodium, extractive matter, a peculiar substance called cubebin, having some resemblance to piperin, and obtained in the same way, and finally ligneous matter.

This ligneous matter forms about $\frac{4}{5}$ths of the whole substance, all the rest united form but $\frac{1}{5}$th. It results from these data that four fifths of the medicine used are inert, and without action upon the animal system. Although the cubebin has been many years discovered, we are not aware that the active properties of cubebs have been attributed to it alone, and we believe that they have justly been referred to the combination of the principles which have been enumerated, and particularly the volatile oils and balsamic resin, of which the action is extremely energetic.

These facts once established, it is of the highest consequence to separate all the principles from the ligneous matter, with the aid of a vehicle proper for each of them, and then to reunite them to form a uniform medicinal article, and we believe we have accomplished this by the following method :

The cubebs, reduced to a coarse powder, is placed in an apparatus for displacement and exhausted by ether, which dissolves the wax, the volatile oils and balsamic resin. The residue is submitted to the action of hydro-alcohol at 20° which dissolves the extractive principle and chloride of sodium. The alcohol and ether are separated by distillation in part, and separately. Evaporation of the hydro-alcoholic solution is then carried on in a water bath until it possesses the consistence of a soft extract, to which the ethereal product is added; the evaporation being continued for a short time volatilizes the ether completely, and a strongly aromatic extract is obtained, as consistent as honey, which it is improper to

subject any longer to the action of heat, in consequence of the contained volatile oils, and which in all cases interfere with complete desiccation.

A kilogramme of the cubebs yielded six ounces four drachms, one part of the extract then is equivalent to five of the cubebs.

This hydro-alcoholic ethereal extract can be administered in all medicinal forms. It can be readily mixed in water by means of mucilage, it can be taken in potions, by injections, &c. &c.

Some trials which should be repeated, demonstrated greater activity of this article, than of the quantity of cubebs represented by it. We shall leave the cause of this, when the fact has been well established, in the hands of clinical observers.

The best form of exhibition is in troches or pastils of an ovoid form, because this mode is most agreeable and convenient to patients, or that of an emulsive syrup may be used.

The following are the most eligible formulæ:

Pastils, or troches of cubebin, or hydro-alcoholic ethereal extract of cubebs.

℞. Hydro-alchoholic ethereal ext. of cubebs,	℥viij.
Alcohol,	lbij.

Dissolve and add—

White sugar in fine powder,	lbj.
Oil of peppermint,	gtt. xviij.

Pour the mixture into flat vessels upon a stove, and allow the alcohol to evaporate at a moderate heat. When the mass is completely desiccated, reduce it to fine powder, and add a sufficient quantity of the mucilage of gum tragacanth to form troches—18, 12, 9 or 6 grains each. Most persons can swallow with facility those weighing 18 grains, and containing 6 grains of the extract; 10 of these are equivalent to half an ounce of the powder. If those weighing 12, 9 or 6 grains are taken, they can be oftener repeated.

Syrup of the hydro-alcoholic ethereal extract of Cubebs.

℞. Hyd. alcohol. eth. ext. of cubebs, ʒiij.

Suspend by means of mucilage, in

Peppermint water,	lb. i.

Add—

White sugar	lb. ij.

Four ounces of this syrup contain two drachms of extract, equivalent to ten of the powdered cubebs. A tea spoonful may be taken as a dose in water.

M. Labelonye has devised a method of administering the cubebin in the form of sugar-plumbs of an ovoid form, which enclose the substance and prevent its contact with the mouth and throat. These plumbs, when moistened, are easily swallowed; their solution in the stomach is facilitated by the action of the muriatic acid therein contained, and their action upon the organs is rendered more immediate. Each contains six grains of cubebin.

The following is the formula:

℞. Hyd. alc. ether. ext. of cubebs,	ʒviij.
Mucil. of tragacanth,	ʒi.

Mix intimately and add a sufficient quantity of refined liquorice.

Form the above into a mass, and divide into pills, so that each shall contain six grains of the cubebin. Dry them with moderate heat, and envelope them with sugar, as in the ordinary sugar-plumb. *Bull. gen. de Therap.*

ART. LI.—HYDROSULPHURIC AND HYDROSELENIC ETHERS. By C. Lowig.

Oxalic ether renders essential service in the preparation of several ethers of the hydracids, which have not hitherto been known, as for instance the hydrosulphuric and hydroselenic, by bringing it in contact with the sulphuret and seleniuret of potassium. Hydrocyanic and hydrosulfocyanic ethers are prepared in the same manner. Mutual decomposition at the same time takes place with difficulty, and even with a large excess of the compound of potassium, a very considerable quantity of undecomposed oxalic ether passes over by distillation. Hydrosulphuric ether is obtained in the following manner; simple sulphuret of potassium, prepared by decomposing the sulphate of potassa with charcoal, &c. reduced in a heated capsule to a fine powder, is introduced while warm into a retort, and then mixed with a sufficient quantity of oxalic ether, to form a thick pap. After the mixture has been allowed to remain during several hours exposed to a moderate heat, and great care has been taken to exclude the introduction of moisture, so that no sulphuretted hydrogen, or alcohol may form, the process of distillation is commenced and continued with increase of heat until the oxalate of potassa which has been formed commences to be decomposed. The product of the distillation, composed of hydrosulphuric and oxalic ethers, is agitated during the requisite length of time with the concentrated solution of pure potassa, or sulphuret of barium, which decomposes the oxalic ether. The hydrosulphuric ether thus purified, is decanted and rectified with the chloride of calcium. Its purity is tested by the circumstance, that agitated with the solution of sulphuret of barium it no longer affords a precipitate.

Hydrosulphuric ether is lighter than water and possesses an extremely disagreeable odour, of ether and assafœtida, which is very diffusible. It has a sweet persistent taste, and has no

effect upon test paper. It is little soluble in water but communicates in a high degree to this menstruum its taste and smell. It mixes in all proportions with alcohol and the ethers. It burns with a blue flame, disengaging sulphurous acid. On exposure to the air no alteration takes place. If mixed with an aqueous solution of potassa and heated to ebullition, it is not decomposed, while if distilled with the hydrate of potassa in powder, the sulphuret of potassium and alcohol are obtained, but decomposition in this way does not take place readily, and a large quantity of undecomposed ether is disengaged. Potassium decomposes it at a moderate heat, but soon ceases to act, in consequence of the metal becoming encrusted with the sulphuret of potassium and preventing any further action; there is no evolution of hydrogen during this decomposition.

Hydrosulphuric ether exhibits no action upon the deutoxide of mercury, and in this is very distinct from mercaptan, as would be predicted. It, however, precipitates several heavy metallic salts, especially an alcoholic solution of acetate of lead, which is thrown down of a yellow colour. Mixed with a concentrated alcoholic solution of sulphuret of potassium, a white substance is precipitated resembling the mercapturet of potassium of Zeise.

This ether, very probably, can also be prepared by submitting to distillation a well mixed combination of sulphuret of potassium and dry sulphovinate of baryta; the distilled liquid obtained in this way, at least presents all the properties of the ether described. The contact of water in this preparation must be equally avoided. M. Lowig promises to publish hereafter the analysis of hydrosulphuric ether, as well as its specific weight, point of ebullition, and many other of its properties.

The author has obtained the hydroselenic ether in very small quantity, and consequently has little to say of its properties. Its smell is as disagreeable as that of hydrosulphuric ether, it burns with the deposition of silenium and diffuses the smell of horse-radish; in other respects it resembles hydrosulphuric ether.

M. Lowig has found, in *hydrocyanic ether* prepared with oxalic ether, properties analogous to those of the hydrocyanic ether of M. Pelouze.

Journ. de Pharm. and Annal. der Physik und Chemie.

ART. LII.—ON THE USE OF LEAD IN EUDIOMETRY.

By M. Theodore de Saussure.

It is known that leaden shot, moistened with water, and agitated with common air, absorbs oxygen from the latter, at ordinary atmospheric temperatures. This property, which has not hitherto been applied to any useful purpose, affords a method by which the proportion of oxygen in the air may be determined within the one-thousandth part, and which in several respects, may be found preferable to the eudiometers in common use. The process requires about three hours agitation for its completion. The vessel in which the operation is performed is a matras, or cucurbit, to the neck of which is cemented a metallic ring, with slopes fitted to receive a key. This ring contains a screw which extends rather less than two-tenths of an inch within the ring, and is adapted to a metallic plug with a square head, also fitted to receive a key. There is a flanch about one-fourth of an inch wide, provided with a collar of leather, which is made to press the outer edge of the ring of the matras. The keys are designed to screw down firmly the plug, and to prevent the necessity of touching the matras during the operation. The matrases employed in my experiments on common air, have had a capacity of from nine to twelve cubic inches. The neck was generally about six inches long, and its capacity from one-third to one-fourth that of the body or bulb of the instrument, in order to measure the absorption of atmospheric oxygen in this part of the matras. The glass ought not to be less than $\frac{1}{23}$ of an inch in thickness, owing to the danger of breaking by the agitation of the shot. The grains of shot should be the

smallest found in commerce, of which about six will weigh one grain.

A quantity carefully determined by previous weighing, is to be used in each experiment, and is to be very nearly equal to one-fifth the weight of water which the matras will contain. The weight of water for moistening the shot should be one-seventeenth part of that of the metal when dry; a quantity either greater or less than this retards the operation. An excess of water has the additional inconvenience of forming a scum, which interferes with the accurate determination of the volume of gas, left after absorption. Hence the water which moistens the shot is less than 1½ per cent. of the volume of air under examination. The matras charged with moistened shot, and with the mouth open, is exposed for two or three hours in the open air, or the air is renewed with a bellows with a recurved nozzle. Having observed the temperature and pressure of the air, the matras is closed by means of the keys already mentioned. In the analysis of other gases than atmospheric air, a retort, closed by a stopcock, is substituted for the matras already described, and the shot is kept in the body of the instrument. Having exhausted this instrument, the gas to be tried is admitted. In some cases, the air-pump may be dispensed with by filling up the vessel with water after having put in the shot. The water is then displaced by admitting the mixed gases from the pneumatic cistern. The shot is drained by inclining the retort, still held over the cistern. The retort is now plugged with a metallic screw to bring the shot in contact with the mixed gases, and the remaining gas is transferred to a graduated tube in order to be measured. Before transferring, however, the retort neck is plunged under water, of a lower temperature than that at which it was filled. A momentary condensation ensues, intended to prevent the possibility of any escaping in case no absorption had taken place.

In experimenting on atmospheric air, the analysis of which admits of greater exactness than that of other gases, the grains of moistened lead which have hitherto remained unaffected

by the air from being carefully preserved from agitation, are now to be violently shaken entirely in the bulb of the matras, so as to avoid tarnishing the neck. The bulb becomes coated with a yellow pigment, which by three hours of agitation changes to a brownish gray tint, due to a mixture of yellow oxide, with very fine particles of lead, indicating clearly that all the oxygen gas has disappeared. This process affords very pure nitrogen gas. Nitrous gas produces not the slightest diminution of its volume. The method of closing the matras with a screwed stopper is so effectual that it may be left, and the agitation of the shot suspended for an indefinite period.

Having weighed the matras by means of a balance sensible to one or two-tenths of a grain, it is opened while inverted under water, the stopper is replaced by an open stopcock, and while inverted, it is fixed in a ring which by sliding up and down may allow of adjusting the height so as to bring the water to the same level within and without the neck. The temperature and pressure of the air are again observed, and the stopcock is then closed, which should be so easily turned as not to require placing the hands on the matras. The difference in weight of the vessel when partly filled with water, after the absorption, and of the same when entirely filled with water, shows how much gas remains after the absorption is complete. By a similar process, the volume of air before absorption is measured, making due allowance in both cases for the approximate weight of air or gas displaced by the water.

If the neck of the matras were correctly graduated, we might determine by inspection the amount of absorption; but this mode of estimating quantities is too uncertain, and the graduation on a large irregular tube, generally too imperfect to give even a tolerable approximation to the degree of exactness obtained by weighing.

Though it is not proposed to substitute this process by the oxidation of lead, in ordinary analysis, for that of Volta—so prompt and convenient in execution, and so indispensable in various investigations—yet it will be found that the oxi-

dation of lead possesses the following advantages: In the determination of the oxygen by the combustion of hydrogen, uncertainties arise, both from the impurities of the latter gas, and from the destruction of some of the nitrogen.

Chemists are not agreed as to the proportion of oxygen gas in common air, as indicated by the eudiometer of Volta. Humboldt and Gay Lussac made it 21 per cent.; Dalton 20.7 or 20.8; Henry is doubtful whether it be 20 or 21; while Thompson makes it 20. Allowing for the accidental errors inevitable in the use of Volta's apparatus, the chief difference between the results above cited, appears to depend on the different doses of hydrogen, which had been mixed with the atmospheric air for detonation. Humboldt and Gay Lussac made use of *equal volumes* of air and of hydrogen, obtaining thereby, as above stated, 21 per cent. of oxygen. Other authors use a half volume of hydrogen, but my own experiments with this proportion have furnished a result indicating but 20.6 per cent. of oxygen, under the same circumstauces in which the other operation gave 21 per cent. It may be proper to remark, that the mixture of two parts of common air with one of hydrogen, has the advantage of extending very much the use of Volta's eudiometer, for the analysis of impure airs in experiments on respiration and fermentation; for 100 parts of corrupted air, which contain 88 of azote and 12 of oxygen, may be analyzed by a single detonation, if we use 50 parts of hydrogen; whereas, 100 of air, which contain 84 of azote and 16 oxygen, cannot be inflamed by the electric spark, if we add so much as 100 parts of hydrogen. It may be also remarked, that the adding of oxygen to the air, previous to the analysis, only complicates the operation, requires a separate previous analysis of the latter to ascertain its purity, and consequently lacks precision in the result.

The method by oxidating lead introduces no new gaseous ingredient into the air under trial; whereas the residue of a detonation with hydrogen is vitiated by the latter, even after the total combustion of the oxygen.

The *phosphorus eudiometer* has the disadvantage of leav-

ing a residuum, rendered impure by the vapour of phosphorus, by phosphuretted hydrogen, and pure hydrogen, which accompanies the latter. These gases are produced, not by the phosphorus, but by the continued contact of water with oxide of phosphorus. Though these inconveniences may, in a great measure, be remedied by washing the residuary gas with a solution of potash, still they do not allow of obtaining any greater degree of certainty, than to fix the proportion of oxygen in common air between 20 and 21 per cent. Whenever hydrogen exists in air as an impurity, the method of analyzing by phosphorus, even at low temperatures, cannot be adopted.

The lead process is more correct than that in which hydrosulphurets are employed, in proportion as the quantity of water required in the latter case, is so much greater. When not already saturated with nitrogen, this liquid will absorb some of that gas from the residue of the analysis; and if fully saturated, it is liable to part with some, and thus increase the quantity remaining after the operation. It is also superior to the same process, when applied to determine the quantity of oxygen in mixture with carburetted hydrogen; for the latter is absorbed in certain proportions by the hydrosulphuretted liquid, according to its temperature and the degree of its concentration. The eudiometric indications of lead will possess a greater degree of exactness, when, instead of measuring the absorption of oxygen by its volume, it shall be determined by the weight which the metal gains by oxidation. It will only be necessary to dry in vacuo, and in the same vessel in which the oxidation was produced, the residuum—the composition of which is not yet accurately determined.

Lead in contact with air and water, absorbs carbonic acid. The open air contains too small a proportion of this acid to give an indication which, at a single trial, could be distinguished from the errors of observation. The mean of several trials may, however, give a more precise result. From several experiments, made in the day time, I have found as a mean, in 100 parts of air, 21.05 per cent. of oxygen and carbonic acid.

Now, as the mean quantity of the latter gas is known to be $\frac{4}{10000}$ of the whole, we have, by deducting this, 21.01 for the proportion of oxygen.

100 parts of air, taken from an elevation of 10,000 feet above the ocean, contained, after having been deprived of their carbonic acid by pure potash, 20.903 parts of oxygen. Air collected in a crowded ball room at the theatre in Geneva, was found to contain 20.81 per cent. of oxygen, and $\frac{24}{100}$ of one per cent. of carbonic acid.

Jour. de Phar. and Bib. Univ. of Geneva.

ART. LIII.—ON THE PREPARATION OF PROTOIODIDE OF MERCURY. By P. H. Boutigny.

Iodine and its combinations have furnished medicine with several energetic preparations. Most of these combinations have been studied by chemists and are well known and defined; I wish, however, to say a few words on the protoiodide of mercury.

This is one of the surest remedies in the treatment of syphilitic affections, few of which resist its influence, though it has failed in some instances owing in my opinion to errors in its preparation.

The principal modes which are employed in making it are: 1st, mixing together one atom of protochloride of mercury, and one atom of hydriodate of potassa; this mixture is placed in a porcelain capsule and boiling water added; on cooling, the precipitate is collected on a filter, washed and dried. 2d, precipitating the protonitrate of mercury by means of hydriodate of potassa. 3d, using the protoacetate instead of the protonitrate of mercury. Finally, the fourth plan, which is the most simple and direct, but also the most liable to error, is by triturating together two atoms of mercury and one atom of iodine with a little alcohol, till the mercury disappears. The protoiodide prepared in this way always contains metal-

lic mercury, and is always less active than when made by the first process, and moreover it is impossible to procure a pure protoiodide by this method as this salt is composed of one atom of each of the constituents.

As to the second and third processes, any advantages they may offer are balanced by a serious drawback—the difficulty of obtaining the mercurial salts at a minimum of oxidation. It must be evident that this is an indispensable requisite, as otherwise, the protoiodide would be mixed with variable quantities of the deutoiodide, rendering the remedy far more powerful and perhaps fatally so.

The following I believe to be the best:

℞. Pure Calomel, ℥iij ʒv.
Dry Hydriodate of Potassa, ℥ij ʒiv.

Pulverize the hydriodate in a glass mortar and add the Calomel, place the mixture in a porcelain capsule and pour over it ten or twelve ounces of boiling distilled water. After cooling, decant the fluid, collect the precipitate on a filter and wash with distilled water. Dry in the shade and keep in a glass stoppered bottle.

The protoiodide thus prepared may sometimes contain a minute portion of mercury or of its proto-chloride, arising from the hygrometic state of the calomel and hydriodate at the time of weighing them, but the quantity of either is so small as to be of no moment.

Bull. gen. de Therap.

ART. LIV.—ON THE COMBINATIONS OF TARTARIC AND PARATARTARIC ACIDS WITH ETHER AND HYDRATE OF MYTELENE. By M. Guerin Varry.

M. Guerin Varry has discovered that in the reaction between anhydrous alcohol and tartaric acid, either with or without heat, a new acid is produced which he calls *Tartrovinic.* It is obtained in the following manner: boil the alcohol and tartaric acid for some time, and to the liquid add carbonate of baryta until it is entirely neutralized; then decompose the new salt of baryta thus formed by sulphuric acid; separate the sulphate of baryta, and evaporate under the receiver of an air-pump the liquid which remains.

Tartrovinic acid is white, with a saccharine and acid taste, it crystallizes in prisms with oblique bases, burns with a bluish flame resembling that of alcohol, and in burning emits the same odour as tartaric acid.

If kept in a state of ebullition with forty times its weight of water during ten hours, it becomes entirely transformed into alcohol and tartaric acid. Decomposed by heat, it yields alcohol, water, acetic ether, acetic acid, carbonic acid, carburetted hydrogen, a volatile oil, and a substance resembling pyroacetic spirit. The residue consists of pyrotartaric acid and an oleaginous substance.

The tartrovinic acid acts upon iron and zinc, with the evolution of hydrogen.

It precipitates baryta from water; the precipitate is insoluble in an excess of acid. It has not the same effect upon strontia, potassa, or soda; it forms a precipitate with lime water, which becomes redissolved by an excess of acid. Its composition is—2 atoms of tartaric acid, 1 atom of ether, and 1 atom of water.

This formula represents it: $C^8H^8O^{10}+C^4H^{10}+H^2O$.

Tartrovinates.—These are unctuous to the touch, crystallize in handsome forms, burn with flame, fuse between 175° and 215°, are decomposed above this temperature, are soluble

in water and diluted alcohol, and are changed by ebullition in water, into alcohol and tartaric acid.

Treated with an alkali between 160° and 170°, they disengage alcohol, acetic ether, and an excessively bitter oily substance.

The tartrovinate of silver is anhydrous; all the others studied by the writer, contain water of crystallization, which can be removed by evaporation.

The dry tartrovinates can be regarded as formed of 2 atoms of tartrovinic acid, 1 atom of ether, and 1 atom of the base.

Paratartrovinic Acid.—This is obtained in the same way as the tartrovinic acid, from which it only differs in composition by an extra atom of water. Its chemical properties are very different from those of tartrovinic acid. The same is the case with the corresponding salts which are formed by the acids, although the paratartrovinates have, when dry, the same composition as the tartrovinates. The spirit of wood, (bihydrate of methylene,) submitted to a similar action of tartaric and paratartaric acids, produces tartromethylic and paratartromethylic acids, which in composition and the salts which they form, perfectly correspond to the tartrovinic and paratartrovinic acids and their salts.

Journal de Pharmacie.

ART. LV.—NOTICE OF A NEW SALT OF COPPER.

By F. Wohler.

I have found that the neutral acetate of copper can combine with a larger proportion of water, than that contained in the ordinary crystallized verdigris. The new salt is interesting in many points of view; it forms large, very beautiful transparent crystals, of the same blue colour as the sulphate of copper, which establishes at once a well marked difference between it and the common neutral acetate. If a crystal is heated to 30° or 35° C., it becomes immediately opaque and green, like verdigris, without change of form, and can then be crumbled, by gentle pressure, into a mass composed of the minute crystals of verdigris. This transformation is more apparent, when the salt is thrown into warm water; moreover, the slower a crystal is heated, the larger and more distinct are the crystals into which it is subdivided. This phenomenon has a perfect analogy with such known modifications of form, as take place without a change of composition, and which have been noticed in sulphate of zinc, sulphate of magnesia, &c.; and it is for this reason especially, that this salt of copper appears to me worthy of some attention, for it shows that in phenomena of this kind, care should be taken to observe and distinguish between the cases where a change of form occurs with out change of composition, and those in which one is the cause of the other. The phenomenon we have presented, belongs to the last mentioned; as, to the alteration of colour and form is added, the separation of $\frac{4}{5}$ of the water of crystallization of the salt, which last is not perceived while the crystal yet remains entire, although rendered pseudomorphous, because the separated water remains enclosed between the minute crystals of the new formation; and, for the same reason, immediate analysis shows that in it there is the same proportion of water as in the modified crystal. This circumstance might easily escape detection; for a similar crystal, upon becoming green, may allow of the gradual evaporation of this

water, even small as it is, by contact with the atmosphere. But it is only sufficient to submit it to compression, to find that the aggregate of minute crystals are impregnated with water; and if this be done between sheets of blotting paper, they will be thoroughly moistened.

The quantity of water which abandons the blue salt in its transformation to the green one, is from 26 to 48 per cent.; it is four times as much as what still remains in the latter, that is to say, in the ordinary crystallized verdigris. The blue salt then contains 33.11 per cent., or 5 atoms of water; it is obtained in a very simple manner by dissolving verdigris in water acidulated by acetic acid, at a temperature below the point of ebullition and then allowing it to crystallize.

Jour. de Phar. from the Ann. de Physik und Chemie.

ART. LVI.—ON THE PRESENCE OF ARSENIC IN PHOSPHORUS.

Mr. Hertz an apothecary having observed that phosphoric acid prepared according to the Prussian pharmacopœia, by treating phosphorus with nitric acid, becomes of a yellow colour on the addition of a solution of sulphuretted hydrogen, Mr. Barwald made some experiments on the subject; he passed a current of sulphuretted hydrogen through phosphoric acid prepared in the same way, and obtained from a pound of the acid, eight grains of a yellow precipitate, which when mixed with carbonate of soda, was decomposed in a glass tube, by means of dry hydrogen.

A metallic ring was formed at the upper part of the tube, which, from its appearance and its odour when placed on live coals, was ascertained to be metallic arsenic. Phosphoric acid from other shops in Berlin, afforded the same results. Mr. Barwald satisfied himself by careful experiments that neither the vessels employed, the nitric acid used in preparing the

phosphoric acid, nor the sulphuretted hydrogen, contained arsenic, and that the arsenic was combined with the phosphorus itself. He also learned from another druggist, that water in which phosphorus had been long kept, was also found to contain arsenic; this fact was also confirmed by Wittstock. Nevertheless, phosphorus which he himself prepared was exempt from this admixture.

From other experiments he ascertained that a considerable proportion of arsenic might be mixed with phosphorus, without changing the external appearance of the latter, except that it became of a deeper colour especially at the surface. If the quantity was very great, the mixture was of a steel gray colour, but was soft and ductile like wax.

Mr. Barwald attributed the presence of this metal in the phosphorus to the sulphuric acid employed to extract the phosphoric acid; and describes in what way a pure phosphoric acid may be obtained from phosphorus containing arsenic; for this purpose he advises, that the phosphorus be treated with thirteen times its weight of hot nitric acid of a specific gravity of 1,200, in large glass vessels having a narrow opening, till the phosphorus is all dissolved. When the solution is evaporated to one half, a violent reaction takes place accompanied with a disengagement of red fumes. Mr. Wittstock explains this, by admitting that the diluted nitric acid, at first only changes the phosphorus to the state of phosphorous acid, and that it only becomes phosphoric acid when the menstruum has become suffciently concentrated; at this stage the phosphoric acid is formed at the expense of the nitric acid that remains. This latter must be added as long as red fumes are disengaged. The evaporation is to be pursued in a platina or porcelain vessel as long as nitric acid is given off, which takes place when the temperature has been raised to about 400° F. The phosphoric acid is then to be purified by means of sulphuretted hydrogen. To get rid of any excess of this latter, Mr. Wittstock uses vegetable charcoal, heated to redness and then treated with nitric acid and well dried.

M. Liebig, in repeating the experiments of MM. Barwald and Wittstock, ascertained that phosphorus purchased at Francfort also contained a considerable quantity of arsenic. He also verified the assertion of these chemists, that in the oxygenation of phosphorus, by diluted nitric acid, there was principally a formation of phosphorous acid; and also that when this acid solution is evaporated, to get rid of the nitric acid, at a certain degree of concentration, there is a formation of phosphuretted hydrogen, which reduces all the arsenic or arsenious acid present; hence there is a deposition of a heavy black powder; this is metallic arsenic. This able chemist, therefore, proposes, in the purification of phosphoric acid, to use phosphorous acid instead of sulphuretted hydrogen, as the latter sometimes requires several days before it completely fulfils the intention. His plan is as follows: two parts of phosphorus are to be oxygenized by diluted nitric acid, the solution evaporated to drive off the nitric acid, until the arsenic is deposited. At the same time, one part of phosphorus in cylinders contained in glass tubes, is to be placed in a funnel, in a cellar, and the phosphatic acid (a mixture of phosphorous and phosphoric acids,) thus obtained, is to be used to purify the phosphoric acid; for this purpose the latter is to be diluted with a little water, filtered, the phosphatic acid added, and the whole evaporated; if any arsenic is deposited, the process is to be repeated. *Journ. de Pharm.*

ART. LVII.—UPON A REDDISH BLUE COLOURING MATTER, WHICH FORMS FROM THE DECOMPOSITION OF OSCILLARIAS. By Prof. Nees d'Esenbeck, of Bonne.

M. Bluff, of Aix la Chapelle, having sent a quantity of Confervæ, procured from the warm springs of that place, to M. Nees d'Esenbeck, at his request; a glass vessel containing them, and filled with mineral water, was received by him on the 15th of December, 1834. They were not, however, in the state requisite for studying their characters, and the vessel remained in a room well lighted, but not exposed to the sun, in which the temperature varied from 8° to 10° R. On the 8th of January, the water which covered the green, slimy deposit, exhibited a singular and beautiful play of colours. It was blood-red when viewed from above, and a beautiful sky-blue when held against the light. Upon opening the vessel, an insupportable marshy exhalation, combined with sulphuretted hydrogen, issued from it. The fluid was separated by the filter and distilled water poured upon the deposit; this, at the end of twenty-four hours, assumed the same deep hue. This operation was repeated during eight days, and always at the end of twenty-four hours a beautiful coloured liquid was obtained; so that the small quantity of half putrid oscillarias afforded a rich source of colouring matter. The smell of sulphuretted hydrogen disappeared after the second maceration, and the strong marshy odour alone remained. The confervæ were slowly reduced to a slimy deposition. The following experiments were then made on the filtered water, possessing this beautiful colour:

In a glass tube, exposed to the rays of the sun, the colour remained until the end of three weeks, but this colour was equally long a time in disappearing in a glass excluded from the light: during the evaporation of the liquid, an intolerable stench was generated, and the residue of a violet colour, when washed with alcohol, continued to emit the strong odour of animal excrement. This residuum was almost insoluble in

water, but produced a blue solution by the addition of muriatic acid.

To experiment with reagents—the liquid of the last macerations was chosen, which from all appearances no longer contained a portion of the mineral water. The changes produced by these reagents were observed at the termination of eighteen hours.

With alcohol a reddish purple flocculose precipitate was formed.

Tincture of galls produced a deep blue precipitate, the supernatant liquid was yellow and clear.

Nitrate of silver occasioned a dirty brown precipitate; and complete decolouration.

Acetate of lead afforded an abundant white precipitation, and sulphate of copper a feeble sky blue precipitate.

Alum and carbonate of potassa formed a copious white precipitate with a violet tint.

With the protonitrate of mercury a very beautiful violet precipitate was thrown down, and complete decolouration with corrosive sublimate; the precipitate was copious, flocculent and of a beautiful deep blue. Muriatic acid heightened the colour, sulphuric acid yielded a precipitate slightly violet, and lime water one of a white colour and flocculose.

It may be inferred with much apparent truth, from the chemical properties which have been described, that the cause of the colour is attributable to a substance closely allied to albumen. The manner in which it is affected constitutes a marked distinction between it and the known blue vegetable colouring matters; thus it is in a manner the opposite of Heliotrope in its properties. It is equally dissimilar to the blue colouring matter of flowers, in the effects which acids produce upon it; its want of durability distinguishes it from indigo. This colour on the contrary resembles the blue colour which MM. Caventou and Bonastre obtained from the white of eggs treated with muriatic acid: but in the liquid in question, no muriatic acid was present, and these authors do not mention that this colour appeared sometimes red and at others blue.

In the last peculiarity this substance resembles the opaline matter, which, however, is in every respect chemically different from it. M. Nees d'Esenbeck proposes for it the name *saprocyanine*, or rather as the colour appears blue and red, that of *saprochrome*.

As it is to be presumed that the source of the colour exists in the confervæ which belong to the genus oscillaria, the following comparative experiments were made:

A liquid containing vegetable albumen and prepared with the juice of the potato, was placed in the same circumstances, but without obtaining the result expected. With the *zygnema quininum*, the *sphærococcus crispus* and the *pamella cruenta* of Agardh, the same thing occurred. The addition of muriatic acid did not produce a blue colur.

The recent *nostoc communis* exhibited at the end of twelve days a red tint, without this alga being altered, but the colour did not continue long. The dried nostoc produced no colour at all.

The experiments with the *oscillaria nigra* (Agardh,) were more successful. This oscillaria submitted to experiment on the 28th of January, exhibited in four weeks upon the surface of the deposit a beautiful shade of colour between violet and red, which upon agitation was communicated to the water. The liquor at that time exhaled a strong marshy odour, without the cadaverous character belonging to the phenomenon produced by the oscillaria from Aix la Chapelle.

The *cercaria viridis* M. which in the summer of 1835 had collected in considerable quantity in a reservoir of the botanic garden, so that the entire surface was covered with a thick grass green layer of dead animalcules, did not produce the colour in question.

It cannot be any longer doubted that the very remarkable genus *oscillaria* more particularly, and the *nostoc communis*, both equally abounding in azote, were the causes of the phenomena we have described; and that azote which distinguishes these genera from the various other common confervæ must

play an important part in the production of this colouring matter. But it is proved at the same time by the experiment upon the *cercaria* which has been mentioned above, that matter purely animal, evincing, as in this case by the green colour, a still greater resemblance to those algæ which are most consistent, is not fitted for the production of this colouring material.

Several other specimens of confervæ obtained from Aix la Chapelle, in a perfect state of preservation, were recognised as belonging to oscillaria vivida (Agardh,) a species closely allied to O. limosa. But certainly the warm springs of Aix la Chapelle must contain numerous other species of the same genus.

The subject which has just been considered, important as it is, connected with the astonishing group of oscillarias, which seem to be the link between vegetable and animal life, can, moreover, assist in the explanation of the phenomenon termed blood-like water, bloody rain; and upon which, a most meritorious naturalist, Professor Ehrenberg, has lately presented so complete a memoir. In it we are informed of all the infusoriæ variously coloured red, and of the minute plants of the families fungi and algæ, which have been considered the cause of blood-like water.

The observation of M. Nees d'Esenbeck, is distinguished by the difference of colour, according to the direction of the light, and by the cause of its production, the decomposition of the algæ. To the same cause must be attributed the blood-like water of Lake Lubotin, examined by Klaproth; at least, the description of this water, and its chemical properties, exactly resemble those of the water experimented on by M. Nees d'Esenbeck, and the myriophyllum spicatum, which is presumed to be the cause of this phenomenon, can have but little part in its production.

Another similar investigation is that of Vauquelin, upon a substance derived from the spring of Vichy. The liquid, of which this chemist speaks, does not differ from the reddened

water of M. Nees d'Esenbeck, and the solid portion appears to be the oscillaria undergoing decomposition, and which can never be deprived of its earthy particles.

Journ. de Pharm. and Annalen de Pharmacie.

ART. LVIII.—REDUCTION OF THE DEUTOXIDE OF MERCURY IN OINTMENTS.

M. Refueville, Jr. in a letter to the Editors of the Journal de Pharmacie, states that in the preparation of the ointment of the deutoxide of mercury with a certain amount of the oxide to the ounce of lard perfumed with orris root and lavender, he has remarked that this mixture at the end of several months assumes a metallic aspect, deep in proportion to the amount of the oxide employed.

M. Planche had made some investigations into this subject, and had observed that in the red precipitate ointment made with lard, the reduction took place in four months, while with the basilicon ointment it did not undergo this change until the end of six. M. Refueville directs attention to the fact that all the ointments thus altered in colour are rancid, and suggests the probability that the matters added to the oily substance in the basilicon ointment preserve it from rancidity; upon which supposition the longer time occupied in working the change of deoxygenation in this unguent is explained. The basilicon of the French Codex contains wax, rosin, black pitch and oil.

ART. LIX.—TROCHES OF IPECACUANHA.

It appears, that by following the directions given in the formula of the *Codex Medicamentarius* for making this preparation, the saccharine paste is extremely apt to be of a more or less deeply marked gray colour, in consequence of the affinity between the extractive principle of the Ipecacuanha and the water of the mucilage. The endeavour to improve the appearance of the medicine, made by various French pharmaceutists, who directed their attention to the subject, appeared to be unsuccessful, until a method was recently proposed by M. Vaudamme, of Hanzebrouck, by which, from his statement, the desirable degree of whiteness is secured; this method, followed by the adequate extent of desiccation by a stove, produced a handsome article perfectly white. It is as follows:

Take of Pulverized Ipecacuanha,	12	grammes.
Very white sugar,	365	"
Gum arabic,	20	"
Pure starch,	96	"
Orange flower water,	40	"

A mucilage is first made with the starch and orange flower water; the ipecacuanha is intimately mixed with a part of the sugar, the gum arabic and the remainder of the sugar are incorporated into the mucilage, and finally the process is concluded by the addition of the Ipecacuanha and sugar united, the whole forming a homogeneous paste, to be divided into cakes of two grains each.

ART. LX.—NOTE UPON THE DISTILLED OIL OF CAOUTCHOUC. By W. Gregory.

This oil discovered by Mr. Enderby of London, possesses very remarkable properties. It is volatile, extremely fluid, and has an exceedingly low specific gravity. Of this oil I procured a certain quantity from Mr. Enderby, who stated that he had simply purified it by rectification. After having rectified it twice, without ebullition and so gradually as to pass over but two drops per minute, which was accomplished at a temperature between 25 and 30°, I ultimately obtained a liquid weighing 0.666 at 15°. Up to the present time, but one liquid having less specific gravity is known; this is the *eupione* of M. Reichenbach, the density of which is 0.655. But the oil of caoutchouc is not eupione, for it is acted upon and decomposed by sulphuric acid, while eupione when purified by means of this acid is perfectly capable of resisting it.

The odour of the oil of caoutchouc is peculiar and in a slight degree resembles that of eupione, it is however less agreeable and more ethereal. It has no fixed point of ebullition. That of 0.670 begins to boil at 35°, but the temperature soon becomes higher, and at the termination of the distillation it has risen to 65°. This substance therefore cannot be regarded as pure and uncombined.

I have however analyzed it, and the results of the analysis closely correspond to the formula CH_2, that of olefiant gas.

When sulphuric acid is added by little and little to the oil at the bottom of a long tube, taking care to close and refrigerate the tube after each addition, a liquid is obtained which is supernatant upon a brown mass and equal in quantity to half the oil employed. This liquid, after being washed with water and potassa, was distilled, and furnished an oil having an aromatic terebinthinate odour and boiling at 225°, or perhaps a little higher, a circumstance somewhat remarkable. The analysis of this new liquid still gave the formula CH_2.

These analyses have been made by M. Liebig, who direct-

ed the attention of chemists to the alteration which oil of caoutchouc underwent by the contact with sulphuric acid. M. Liebig, (*Annalen der Pharm.* Oct. 1835,) has thrown out the idea that this oil may be changed into eupione by the acid; and if this is so, it is probable that the eupione is produced by the reaction of the acid employed to extract it, according to the method of M. Reichenbach. It does not appear to me probable that the second oil, of which I have spoken above, is eupione. When the point of ebullition, 47° of this last, is compared with that of the other, which is 225°, it is obvious that there must exist a remarkable amount of impurity, even should these liquids be the same. At the same time, I must avow, that I have obtained during the past year, a certain quantity of a liquid which I regard as impure eupione, by treating the products of a distillation of caoutchouc, procured myself, with sulphuric acid. But this distillation did not afford an oil like that of Mr. Enderby.

M. Liebig also thinks that the other substances described by M. Reichenbach, are only the products of reaction, and do not exist in the pitch. But I may be permitted to remark, that the presence of creosote is detected in pitch as well as in pyroligneous acid, by its odour and by its antiseptic power; that paraffine can be purified in a considerable degree by rectification, and that M. Reichenbach has rendered it probable, in his last memoir upon eupione, that this substance can be extracted from the tar of oil, by complete rectification, and without the addition of any reagent. Be the fact as it may, the change produced upon the oil of caoutchouc by sulphuric acid, merits the attention of those who are engaged in studying the empyreumatic substances; without attaching importance to it as an example of isomery, the difficulty of purifying these products, is apparent.

Journal de Pharmacie.

ART. LXI.—ACTION OF SULPHURIC ACID UPON OILS.

M. E. FREMY has examined the action of sulphuric acid upon olive and almond oils. These oils treated with half their weight of concentrated sulphuric acid, gave origin to four combinations, which the author designates under the names sulpho-stearic, sulpho-margaric, sulpho-oleic and sulpho-glyceric acids.

Sulpho-stearic and sulpho-margaric acids are decomposed by water, the first into sulphuric acid and a new one, hydro-stearic acid, the second into sulphuric and meta-margaric acids.

Hydro-stearic acid is white, soluble in alcohol and ether, and crystallizes into hard granular masses. Its composition can be represented by that of stearic acid, hydrated.

Meta-margaric acid is less soluble in alcohol than the preceding; it melts at 49°. In the salts, it is isomerical with margaric acid; but isolated, it contains more water.

Sulpho-oleic acid is soluble in alcohol and water, but the aqueous solution is slowly decomposed at the ordinary temperature. It is instantaneously decomposed at 100°; affording sulphuric acid, and a new one, hydro-oleic acid, the composition of which is represented by that of oleic acid, hydrated.

Hydro-oleic acid, submitted to heat, is transformed into water, carbonic acid and two hydrogenized carbonated liquids, *oléene* and *elæne;* they contain hydrogen and carbon in the same proportions as olefiant gas, but in a greater state of condensation. Oléene melts at 55°, and elæne at 108°. They both combine with chlorine.

Journal de Pharmacie.

MINUTES OF THE COLLEGE OF PHARMACY.

Stated meeting held October 25, 1836, H. Troth, Vice President, in the chair.

The minutes of last stated meeting were read and adopted.

The committee appointed on the revision of the old English Patent Medicine Directions, and for the purpose of having the same printed, are continued.

The following letter of resignation was read and adopted:

"*To the President and Members of the Philadelphia College of Pharmacy.*

"GENTLEMEN—I beg leave to tender my resignation as a member of the College, though in thus withdrawing from it, I trust that I shall never loose the deep interest I feel in its prosperity, and increased usefulness.

With sentiments of high regard and esteem, I am, &c.

R. EGLESFELD GRIFFITH.."

Specimens of the root, seeds and oil of the *Symplocarpus fœtidus*, were presented to the College by Joseph M. Turner, one of the graduates of the Institution.

The following resolution was laid on the table agreeably to the rule in that case:

"We propose Dr. Robert Eglesfeld Griffith, Professor of Materia Medica, in the University of Maryland, as a candidate for Honorary Membership in the College.

(*Signed,*) HENRY TROTH,
WILLIAM HODGSON, Jr.
CHARLES ELLIS.

Stated meeting held Nov. 29, 1836. The minutes of last meeting were read and adopted. The minutes of the Board of Trustees were read, from which the College is informed of the election to resident membership of Charles L. Heinitsh, and that the following gentlemen were duly elected associate members in this institution, viz.: *Flodoardo Howard*, of Washington city, D. C.: *George W. Merchant*, of Lockport,

New York; *Dr. Washington L. Atlee*, of Lancaster city, Pennsylvania.

Two vacancies having occurred in the Board of Trustees, William Biddle, and Edward Needles, were duly elected Trustees.

Resolved, that the College proceed to the election of Dr. Robert E. Griffith. Whereupon he was declared to be duly elected an Honorary Member of this College.

The resignation of Edward Hopper was accepted, and he allowed to retain his certificate of membership, agreeably to his request.

Resolved, That during the continuance of the lectures, the meetings of this College be held on the evening of the day preceding that on which they were usually held.

Resolved, That the committee on patent medicine directions be authorized to have 300 reams printed, provided they obtain subscriptions sufficient to defray the expense.

Stated Meeting, December 26, 1836. The minutes of last meeting, and of the Board of Trustees, were read.

Dr. Joseph Carson having been recommended, at the last meeting of the Trustees, as a candidate for resident membership, the college proceeded to ballot; whereupon he was declared to be duly elected a resident member.

The resignation of Joseph Trimble was accepted.

PATENT MEDICINE DIRECTIONS.

The Philadelphia College of Pharmacy having had under consideration the subject of revising the old English Patent Medicine Directions, have instructed their Committee to print an edition of three or four hundred reams.

These Directions, thus improved by the omission of exceptionable matter, are in progress of being printed, and may be obtained by application to the members of the College.

MISCELLANY.

Cause of Decrepitation ; by M. Baudrimont.—Most authors on this subject have attributed decrepitation to the vaporization of water contained between the laminæ which compose the substance operated upon. This opinion not appearing to me well founded, I dried at a low temperature and by various means, different anhydrous substances capable of decrepitation, but found that notwithstanding the most perfect desiccation, they still decrepitated when suddenly heated. The tendency of the decrepitating body to a separation of its parts in the direction of its cleavage faces, leads me to the following conclusion : that decrepitation is owing principally to the bad conducting power of the several substances, the outer layers expanding by heat, without a corresponding internal expansion, and consequently splitting off with a kind of explosion. There are instances, however, in which the substance is volatile and for this reason decrepitates ; but this is not in general the case with decrepitable substances.

American Joarnal of Science and Arts—and L'Institut, No. 158.

On Donium, a new substance discovered in Davidsonite ; by Mr. Thomas Richardson.—The mineral Davidsonite was discovered by Dr. Davidson, of Aberdeen, in a marble quarry near that city. An analysis of it by Mr. T. Richardson, proves it to be composed of Silica and a base which Mr. R. supposes to be an oxyd of Donium. This oxyd is distinguished from the alkaline and earthy bases, and from several of the metallic ones, by the green precipitate which it gives with the sulph-hydrate of Ammonia; and its solubility in the caustic alkalies, and in carbonate of Ammonia, the light brown precipitate thrown down by sulphuretted hydrogen, and the green given by sulph-hydrate of ammonia, distinguish it from all the others.

The name Donium is a contraction of Aberdonia, the Latin name of Aberdeen, near which place Davidsonite occurs.

Rec. of Gen. Sc., June, 1836.

Since the publication of Mr. Richardson's paper descriptive of Donium, Dr. Bause, of Penzance, has announced that he has been examining for some time a new oxyd which turns out to be identical with that of Donium. We may soon expect a complete account of Donium and its compounds, from Dr. Thomson of Glasgow.

Ibid and Ath. No. 452, *June* 25, 1836.

Tobacco, a remedy for Arsenic, communicated to the Editor by Rev. Ralph Emerson.—About the year 1820, Miss Sophia Eastman of Holles, N. H. (now connected with the orphan asylum in Troy, N. Y.) fell into the mistake so often committed, of eating a portion of arsenic which had been prepared for the destruction of rats. Painful symptoms soon led to inquiry; and her mistake was discovered. An elderly lady who was present, advised that she should be made to vomit as speedily as possible, and as she had always felt a perfect loathing for tobacco in every shape, it was supposed that this would at once effect the purpose. A pipe was used, but without producing any nausea. She next chewed a large portion of strong tobacco, and swallowed the juice, and that without even a sensation of disgust. A strong decoction was then made with hot water of which she drank perhaps half a pint. Still there was neither nausea or dizziness, nor did it operate at all either as an *emetic* or a *cathartic*. The painful sensations at her stomach, however, subsided, and she began to feel well. On the arrival of physicians, an emetic of blue vitriol was administered, which operated moderately once. One or two days after, there was a discharge of a dark green color, approaching to black. No ill consequences followed.

Another case occurred in the same place, a few years subsequent, in which arsenic was taken through mistake, by a sick person, and she employed tobacco with the like success. She, too, had always loathed the article, but now chewed it and swallowed the saliva, without producing sickness at the stomach. No emetic was administered in this case, nor any other remedy. Happy will it be for our race, should this insidious poison, now the slow death of so many, be employed only as an antagonist to those other deadly poisons, for which it may have been provided by the Creator, as a sure and speedy remedy.

The above facts I lately received from Dr. Eastman, of Holles, the father of Sophia, and from her sister, at whose house Sophia committed the mistake.

Yours truly,

Ralph Emerson.

Andover, Mass. May 26, 1836.

American Journal of Science and Art.

Sulphate of Baryta in Calomel.— M. Moritz, of Strasburg, has published the fact, that in a quantity of protochloride of mercury, manufactured in Paris, and obtained by him from that place, he discovered an admixture of sulphate of baryta. The article was exceedingly beautiful, and free from corrosive sublimate. Submitted to the action of heat, it only became volatilized in part. The experiment was repeated in a tube closed at one extremity. The quantity used was a gramme, which left as a residue, a white impalpable powder, unaffected by heat, insoluble in water and the mineral acids, and which was recognised to be the above salt. Its weight was five decigrammes. *Journal de Pharmacie.*

Researches into the Nature and Properties of the Compound formed by Albumen and the Bichloride of Mercury.—When albumen mixed with water is added to a solution of corrosive sublimate, a precipitate is obtained which no longer possesses the poisonous properties of the latter, as has been proved by M. Orfila. With regard to the composition of this precipitate, however, chemists are still undetermined. Some authors consider it as a combination of the protochloride of mercury, with the altered albumen.

M. Lassaigne, on the contrary, concludes from his experiments, 1. That the albumen and fibrine unite with the corrosive sublimate without decomposing it. 2. That the insoluble compounds which result from this combination, are soluble in the chlorides, bromides and iodides of the alkaline metals; which circumstance should induce those who administer albumen as an antidote to corrosive sublimate, to bring about a speedy evacuation of the compound formed, in order to avoid the risk of a re-solution of it, by the chloride of sodium contained in the stomach. 3. That in the compound thus formed, 10 atoms of albumen are combined with 1 atom of bichloride of mercury, or albumen, 93.55; bichloride, 6.45. 4. That in the preservation of animal substances by corrosive sublimate, a similar combination takes place between this salt and the albumen and fibrine of the organic tissue. *Journal de Chemie Medicale.*

Deaths from Morison's Pills.—Our late English journals contain a number of cases in which death has followed the administration of this quack panacea. One of the agents of Morison, a certain Frederick Salmon, was tried in April last for manslaughter, and convicted; but recommended by the jury to mercy, as he was not the compounder but vender only of the pills. He was nevertheless sentenced to pay a fine of 200*l.*, (about 900 dollars,) and to be confined in Newgate until the same be paid. A report of the trial, with the sentence of the Recorder, is contained in the London Medical Gazette of April 9th and 10th last.

Amer. Jour. Med. Sci.

Adulteration of White Lead.—The large quantities of sulphate of barytes imported into France, principally for the purpose of mixing with white lead, has induced us to point out the mode in which this adulteration can be detected, and the relative proportions of the two articles determined.

This method is based on the solubility of carbonate of lead in nitric acid, and the insolubility of the barytic salt in the same menstruum. One hundred parts of the white lead suspected to contain barytes, is to be finely pulverized and dried; the latter precaution is necessary, as what is termed dry white lead contains more or less moisture; from actual experiments made in 1835 on six different specimens, it was found that one contained $\frac{4}{100}$ of water, two $\frac{5}{100}$, two $\frac{6}{100}$, and one $\frac{7}{100}$. The dried lead is then

to be introduced into a matrass, and nitric acid diluted with half its weight of water gradually added, till the whole that is soluble is taken up by the acid. After the acid has ceased acting, the mixture is to be left to settle, the clear liquid poured off, and the residue, if any, washed with pure water, dried and weighed; its weight indicates the portion of insoluble matters mixed with the lead.

This method has proved to us, 1st. That even the pure white leads leave a residue which may vary from $\frac{1}{2}$ to 1 per cent.; this residue is siliceous, and probably arises from the wearing away of the mill stones used in grinding the lead; 2d, that other white leads contained from $\frac{19}{100}$ to $\frac{20}{100}$ of insoluble matters; this was principally sulphate of barytes. It is even probable that this proportion is much higher in the common white lead of commerce. M. Robiquet, in the article *Ceruse*, (*Dict. Technologique*, iv. 29,) states some of the proportions in which white lead is adulterated with this article. He says, that in Germany, what is called Venice white (*Venesianer weiss*) is formed of equal parts of carbonate of lead and sulphate of barytes; that Hamburg white (*Hamburger weiss*) is composed of three parts of sulphate of barytes, and one part of carbonate of lead; Holland white (*Hollander weiss*) of the same proportions, and that another but inferior article, also called Holland white, contains seven parts of barytes to one of lead.

Jour. de Con. Usuelles.

Leaves of the Grape used as Moxa.—M. Bridel, of Bleu, has proposed the employment of the leaves of the common grape, (Vitis vinifera,) as a substitute for the down of the Artemesia chinensis in the manufacture of moxa, of which these articles are usually fabricated. The following is the mode of preparation:

At the end of autumn, when the frost has caused the fall of the leaves, and they are somewhat withered, they are collected and thoroughly dried in an oven at a moderate heat; they are then beaten in a mortar until a soft cottony mass is obtained. To secure the down which results from this simple operation, they are enclosed in tight boxes, and kept in a dry place. This down is used to make the moxa in the same way as that of the Artemesia, and answers all the purposes as well.

Formula for the internal administration of Iron. By Meurer.—The following formula, though much recommended by chemists, has been little employed in medicine. It is an advantageous substitute for chalybeate waters, which are less efficacious than it, and much more expensive:—℞. Sulph. ferri chryst. ʒss., sacch. alb. ʒiss., tere simul et divid. in chart. xii. ℞. Bicarb. sodæ ʒss., sacch. alb. ʒiss., tere simul et divid. in chart. xii. Dissolve one packet of each separately in water, mix, and let it be

taken as an effervescing draught. The decomposition is as follows; 1st, carbonate of the protoxide of iron; 2nd, sulphate of soda; 3d, a little undecomposed carbonate of soda, the quantity of bicarbonate being more than sufficient for the decomposition of the sulphate of iron.—*Amer. Jour. Med. Sci.*—*Dublin Jour.* from *Summarium des Neuesten in der Heilkunde.*

Battley's *Liquor opii Sedativus and Liquor Cinchonæ.*—This preparation, which has been made according to a secret formula for many years, is said to be formed simply by *macerating opium in distilled water* for a given time at an equable and gentle temperature (that of the laboratory,) with free access of light and air. About a seventh part of alcohol is added at the end of the process, in order to preserve the liquor.

Mr. Battley's "*Liquor Cinchonæ*" is prepared by macerating seven pounds of coarsely-powdered bark in seven gallons of distilled water for 24 hours, straining, and evaporating, to a certain extent, in wedgwood dishes. About four ounces of spirit may be added to preserve the liquid. It is said to be a preparation equal to quinin: seven or eight drops are a sufficient dose.

American Journal of Medical Sciences, and Lancet.

On Pharmaceutical Preparations.—Dr. Robert D. Thomson exhibited to the Westminster Medical Society (March 26th 1836) several specimens of vegetable concentrated extracts, which were prepared by careful attention to the nature of the elements which entered into their composition. He remarked, that in regard to extracts, it is an important object to reject all those parts which have no action upon the animal system. For example, in the *extract* of *conium*, the only constituents which can possess any remedial agency, are *extractive* or *tannic* acid (both of which names are applied to substances possessing identical properties,) and the oxide of coneine. But tannic acid readily decomposes under particular circumstances, as by exposure to the air, when saturated with moisture, and is then converted into a different substance, *ulmine* or *ulmic* acid, possessing different properties. The principle *coneine*, in which the narcotic properties of the *conium maculatum* reside, is a colourless oil, but when exposed to the atmosphere, it is changed into a green resin, which imparts its colour to the extract. Hence a good green colour is a test of the genuine nature of this extract, if proceeding from the proper colouring matter, and hence a spurious extract is too often introduced into apothecaries' shops, which is coloured by means of salts or copper. The specimens of this extract before the Society, possessed the green colour of the oxide of coneine in perfection, and after having been kept for two years, was as perfect as when first formed, and not a trace of copper could be detected by appropriate tests. It was double the strength of the common extract of the shops, a dose consisting of two grains and a half. The specimen of

extract of *hyoscyamus*, also exhibited, had been preserved for a similar period, without being in the slightest degree impaired, either in appearance, chemical properties, or narcotic effects. Solubility is a test of the purity of this extract. Its dose is two grains and a half.

Dr. THOMSON called the attention of the Society to a new preparation, the *kinate* of *quinin*, from the *cinchona cordifolia*, in which the quinin, instead of being in combination with sulphuric acid, as in the form in which that medicine is usually administered, is retained in union with its native acid, and presented in the same form in which it exists in bark. The aromatic and astringent principles of the bark are also retained in this preparation, so that it actually comprises in a concentrated form all the active principles of the bark. It is pale yellow, quite soluble in water, and in doses of five grains forms a more powerful remedial agent than sulphate of quinin. Dr. T. observed, that in favour of the employment of this remedy, he might state that in the course of his experience in China, he had found bark much more effective in the cure of intermittent fever than sulphate of quinin, showing that the astringent principles of bark possessed a powerful influence on the human constitution. The great objection, however, to the use of the bark, is its bulky form. This objection is remedied by the kinate of quinin, which, from numerous trials, has been proved to possess fully the properties of bark.

American Journal of Medical Sciences.—Ib.

Purgative without Nauseous Taste.—The following preparation is said to possess a quality much desiderated in purgative medicines, it not being offensive to the taste. ℞. Fol. sennæ, ʒij., Aq. font. f. ℥viij. Infuse during ten or twelve hours in a covered vessel; then strain and make a cup of common coffee with this infusion, to which one-third milk is to be added. This purgative coffee may be taken without any disagreeable taste being perceptible. M. Baudelocque has experimented a number of times at the children's hospital, with this preparation, and it has constantly produced from two to six stools in the twenty-four hours, and does not occasion either griping, vomiting, or intestinal irritation.

Amer. Jour. of Med. Sciences.—Bulletin de Therapeutique, 1835.

Dangers from Certain Cosmetics.—The public seem not to be sufficiently aware of the danger incurred by the use of many of the cosmetics sold for dying the hair. One of the numbers of the *Annales d' Hygiene et de Med. légale* of last year, contains some interesting cases in which very disastrous effects followed the employment of these preparations. A young lady of 18, who used the powder of iris (*Iris germanica*) to her hair, was attacked with convulsions and delirium, from which she did not entirely recover for three months. Two similar cases were communicated to the Academy of Medicine by M. Aumont.

M. Deleschamp has recorded in the *Journ. de Chem. Med.*, t. vii., the case of a young lady who resorted to the Persian Wash* to dye her hair black. The result was that her hair was not entirely blackened, but many parts of her skin took this colour, and the lady became a prey to headaches.

Butini asserts that he has known acute meningitis caused by the nitrate of silver applied to the hair.

American Journal of the Med. Sciences.

Pectic acid in gentian.—M. Bussy took 8 ounces of the root of the *Gentiana lutea* in rough powder, and poured over it 8 ounces of pure water. In a quarter of an hour, he placed the powder thus moistened in a suitable apparatus. He then poured pure water over it in small portions at a time, taking the precaution not to add any more until the first was absorbed. In the course of a few minutes, a very deep brown liquid, of a thick consistence and transparent aspect, strained through into the receiver. He continued the washing until he had obtained 12 ounces of the liquid; when the colour became less deep, he changed the receiver and continued the washing, for which purpose 3 kilogrammes of water were employed. The powder possessed then an insipid taste and slight colour. In 12 hours, the liquid in the first receiver had acquired the consistence of very firm jelly. It was completely soluble in a solution of carbonate of potash. From this solution it was precipitated in the form of a jelly by alcohol, sugar, &c., shewing that it was pectic acid. Bussy subsequently extracted it from gentian by the same process, followed by Braconnet in separating it from carrots. He suggests that the pectate of Soda in solution may be substituted for eggs in clarifying sugar, and for gelatin in clearing wine, &c.—*American Journal of the Med. Sciences, and Journ. de Pharm.*, June, 1836.

Congelation of Mercury by Natural Cold.—Extracts from a minute of observations on freezing Mercury in the open air, made at Gardiner, Maine, January 28th and 29th, 1817.—The whole of the day of the 28th, was intensely cold. At 2, P. M. the thermometer hanging on the wall of a house stood at —6°. About sunset the wind subsided.

A tray of charcoal was placed upon the end of a wharf projecting into the Kenebeck, nearly a hundred yards from any building or other elevated object. On this was placed a thermometer in a blackened tin case, and two phials each containing a small quantity of mercury, the lower half of each phial being blackened, and the phial a little raised from a horizontal position, so that the fluid might be within the blackened part. A similar phial of mercury was placed on the snow at a little distance; but as it underwent no change, no farther notice was taken of it.

* This is a solution of 10 grs. nit. argent. in one oz. of water.

At 10 o'clock in the evening, the thermometer stood at —29°. The sky was perfectly serene and clear. At half past 11, the thermometer had fallen to —32°. At half past 3, (the 29th,) the thermometer was at —38°; the mercury in the phials of course still fluid. The atmosphere was remarkably transparent and perfectly calm. At half past 6, the thermometer stood at —40°. It soon rose one degree while we were bending over to examine it—the mercury in the phials still fluid. I now poured out a small quantity of the mercury into an excavation in a piece of charcoal. At ¼ before 7, the thermometer was again at —40°; the mercury in the phials still fluid; but that on the charcoal was partially congealed. As I examined it with a slender stick, it exhibited the appearance of a soft solid, separating into parts without running into globules; and the fragments were rough, and evidently crystalline. These appearances, however, continued only a short time; but while I was examining it, being of course necessarily bent over it, the whole soon returned to a perfectly fluid state. At 7 o'clock, the thermometer was still as before at —40°. The mercury in the phials was unchanged. That on the piece of charcoal exhibited the same appearances as at the last observation, only in a less marked degree, and it sooner became fluid. Soon after this, the sun rose, and of course the attempt was discontinued.

To Prof. Silliman.—*Dear Sir*,—I send you above, the extract from my minutes of an observation of the effect of natural cold on mercury, on the Kenebeck. A few weeks later, having been supplied by the kindness of the late Mr. Vaughan with several excellent thermometers of Troughton's manufacture, I attempted to ascertain how much effect was attributable to the cooling of the surface by radiation, in a similar state of atmosphere: and on one occasion found a difference of 18 degrees between a thermometer on charcoal on the ground, and another suspended freely in the air, 18 or 20 feet above it—one being 36°, the other 18° below zero. This was in a clear night, and subsequently when clouds appeared, the difference diminished, until at the commencement of snow the two instruments agreed.

Yours very truly,

E. Hall, Jr.

Boston, Wednesday Evening, March 23, 1836.

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